RegionalCooperationCouncil

ZAVOD ZA ZAPOŠLJAVANJE CRNE GORE
EMPLOYMENT AGENCY OF MONTENEGRO

Analysis and Recommendations

Technical assistance to
Employment Agency of Montenegro (EAM)
on upgrading the Infromation system in line
with EURES requirements

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CONTENT

Glossary

Acronym	Full Title
EAM	Employment Agency of Montenegro
ETL	Extract Transform Load
RDBMS	Relational Database Management System
LMIS	Labor Market Information System
DIM	Default Implementation Module
JV	Job Vacancy
JSP	Job Seeker's Profile
ENL	Evidencija nezaposlenih lica (Unemployed persons registry)
SRM	Slobodna radna mjesta (Job Vacancies)

Overall Project Plan

Dates	Activities	Location	Days
01/03 - 06/03	• Preparation of detailed methodology • Preparation of the work plan including structure of the interviews, questioners, workshops and presentations	Zagreb Croatia	4
11/03 - 16/03	• Presentation of main topics, EURES requirements and roadmap, structure of the analysis, expected goals and objectives • Workshops, meetings and interviews with the beneficiary representatives and other stakeholders • Desk review of primary and secondary information • Conducting analysis and review of the current of the IT system including infrastructure (network, servers), software (platforms, LMIS) and capacities	Podgorica Montenegro	5
19/03 - 06/04	• Development of technical specifications for new IT equipment and new software applications in line with EURES requirements • Preparing recommendations to enhance the current IT system, adjustments of the applications to the EURES standards, proposing a roadmap for the implementation of the recommendations • Preparation of documentation on IT policies and procedures in relation to the new system • Completion of the documentation • Preparation and delivery of a workshop on the findings of the analysis and recommendations with key stakeholders from the beneficiary institutions	Zagreb Croatia	10
08/04 - 09/04	• Presentation of the findings and discussion with the beneficiary	Podgorica Montenegro	1
10/04 - 30/04	• Preparation of final work report with adjustments based on the feedback provided by the beneficiary • Wrap up and delivery of the final version of documentation to RCC and MLSW	Zagreb Croatia	4
		Total days:	**24**

INTRODUCTION

Context of the project

- The Employment and Social Affair Platform (ESAP) finances regional projects in the period 2016-2019 with the aim of strengthening the regional cooperation of institutions in the field of labor market and social policy reforms
- EURES (1993) is a co-operative network that gathers employment services and mediates the exchange of information on vacancies and labor, because the job mobility portal is a key to politics and a single EU market
- The ZZZCG (EAM) wants to restore the IT infrastructure base and innovate the software platform (LMIS) with the aim of aligning with EURES requirements in the context of EU accession

Purpose and scope of the document

The purpose of this document is to present findings based on thorough analysis of the current Information system in Employment Agency of Montenegro (EAM) in order to determine As-Is state, and then provide technical assistance and propose roadmap for the system enhancements and upgrades in order to address various EURES requirements and describe To-Be. Recommendations and documentation for system improvements (To-Be state) would include high-level specifications of the IT equipment, LMIS application solution and its essential features.

Project goal is to undertake thorough GAP analysis and to create and deliver documentation containing:

- Analysis of the current system (As-Is state)
- Recommendations and documentation for system improvements (To-Be state) including the high level specifications of the IT equipment, LMIS application solution and it's essential features

Overall Methodology

Applied methodology during the creation of this documentation rested on several key sources of information and understanding of the beneficiary's business processes. It consisted of four main activities:

- **Workshops, interviews and discussions** with key stakeholder and representatives
  - planning the conversations (interviews) with representatives of the IT services and key users who are familiar with the existing software solution
  - Interviews with key stakeholders

- **Insight into the existing system documentation** (technical, functional),
  - It was agreed that the user will send Excel files with key catalogues (SKZ, etc.), user manual (in PDF), and the available technical documentation
  - the beneficiary provided examples and delivered documentation needed for further clarifications on key applications modules of ENL, SRM and others

    - Beneficiary clarified technical specifications of the system and the databases since these are of key importance for the preparation of data for the Exchange with the EURES network
- **Merging and consolidating** meeting minutes, transcripts, screenshots and all other parts of the correspondence (including e-mail and further documents)

- **Writing the formal documentation** containing GAP analysis (To-Be, As-Is states with recommendations for system upgrades based on experience and best practices in the field of labor market information systems)

Timetable of the analysis (Workshops)

- **12.03. Monday**:
    - introduction, goals, creating a general image of the existing information system
- **13.03. Tuesday**:
    - Insight into the existing application system (modules)
- **14.03. Wednesday**:
    - Analysis of business and records processes at a more detailed data level with the aim of defining compliance with EURES data structures
- **15.03. Thursday**:
    - an analysis of IT infrastructure
- **16.03. Friday**:
    - Review of the information gathered, defining the desired structure of the documentation

Analysis Plan

Making general picture of the current system

- Technological basis of the system
- Insight into technical documentation
- Discussing what's good, what's missing
- Outlining dimensions of the system
    - the number of concurrent users of the system
    - the size of a database the number of registered unemployed/jobseekers, employers, Job Vacancies (JV) and other entities
    - average load of the system peak loads,
    - disk occupancy data base,
    - warehouses and other parts of the system performance and
    - keeping up the desired performance of the system

Analysis of the structure of the system and its related parts

- LMIS – the Central System
- Analytical and Reporting subsystem
- presence of the service on the Internet (web pages, services to citizens and employers)
- DMS
- Records management (Protocol)
- human resources
- Intranet solutions and collaborative tools (intranet, Exchange documents, etc.)

- Subsystem of data exchange and interoperability with other systems and institutions (service bus)
- Available environments: production, test, development

Analyzing the security aspects of the system

- Security policy ZZZCG
- Managing users, roles, rights, open user accounts-directory service
- User login in system (SSO)
- Audit logging
- Methods ensuring high availability
- The procedures of recovery from disruption of activity or a system failure
- Backup procedures
- Policy system maintenance (patches, antivirus solutions, protection from malicious programs, etc.)

Analyzing the maintenance methods

- Is the life cycle of the application solution is maintained through:
    - Corrective maintenance (bug fixing etc.)
    - Adaptive (adjustments of the software in order to fit legislative and other business process changes)
    - Preventive (in order to keep the system in optimal performance)
- How are upgrade procedures and delivery of system upgrades conducted and are they in accordance with the needs of the process and of legislative changes
- Source code repository – how are changes saved and is rolling back to previous states possible?

Project Approach

The project approach was based on verified Project Management methodologies including all of the processes:

- **Control and reporting processes** - managing the overall scope of the project and client relationship through change control, issue and risk management, and progress reporting. In initiating phase scope, objectives and approach of project were defined. In closing phase, project deliverables were accepted and approved by client.

- **Work management** - establishing baseline work plan, which has been used to monitor, control, report, and adjust the project activities. The project was managed using PM methodology and previous experience gained in managing similar projects.

- **Resource management** - managing assignments in line with the requirements and work plan as to establish and maintain an appropriate infrastructure for the project, such that it can be delivered on time, within budget, and with the agreed deliverables.

- **Quality Control and Management** was based on regular quality control. It was used to ensure that project activities and deliverables delivered as defined in Project plan.

Key stakeholders

No.	First name and last name	Role	Contact Information
1	**Željko Zorić**	Director Assistant Sector for information system	Employment service of Montenegro (EAM) zeljko.zoric@zzzcg.me www.zzzcg.me
2	**Miodrag Gluvak**	The Chief of the Department of Operational Maintenance	Employment service of Montenegro (EAM) miodrag.gluvak@zzzcg.me
3	**Dijana Jaredić**	Database administrator	Employment service of Montenegro (EAM) diana.jaredic.@zzzcg me
4	**Igor Miković**	Senior Advisor and System Engineer	Employment service of Montenegro (EAM) Regional unit of Herceg Novi for the municipality of Herceg Novi, Kotor and Tivat igor.mikovic@zzzcg.me
5	**Gordana Vukčević**	Head of Section for EURES and International Brokerage in Employment	Employment Agency of Montenegro (EAM) gordana.vukcevic@zzzcg.me
6	**David Perčobić**		Employment Agency of Montenegro (EAM) david.percobic@zzzcg.me
7	**Biljana Krstajić**	Head of Division for Programming and Implementation of EU funds Ministry of Labour and Social Welfare	Ministry of Labour and Social Welfare (MLSW) biljana.krstajic@mrs.gov.me www.mrs.gov.me
8	**Nand Shani**	Team Leader	Employment and Social Affairs Platform (RCC) Regional Cooperation Council Mobile: +387 61 77 45 76 Fra Andjela Zvizdovica 1, 71000 Sarajevo, BiH
9	**Sonja Ivanović**	Head of the unit for working with employers	Employment Agency of Montenegro (EAM) sonja.ivanovic@zzzcg.me
10	**Sabina Kujović**	Independent consultant for statistics	Employment Agency of Montenegro sabina.kujovic@zzzcg.me
11	**Vesna Radulović**	Independent consultant for monitoring of education and occupations	Employment Agency of Montenegro Phone: +382 20 405-220

Collected Documentation

During the meetings with beneficiary representatives, following documents have been provided and used as source of information during the analysis phase:

- ZZZCG Informacioni system - Idejni projekat 2002.pdf
- ZZZCG Information System Brochure
- Evidencija nezaposlenih lica - User Manual.pdf
- Evidencija rada s poslodavcima - User Manual.pdf
- Mjere aktivne politike - User Manual.pdf
- Novčana naknada - User Manual.pdf
- ZZZCG-Tech_Spec_eng.pdf
- Inventory Report - computers by type.pdf
- Inventory Report - computers by Operating System.pdf
- Various Screenshots and other resources

Workshop #1: Analyzing the big picture of the ZZZCG information system

Maintenance of LMIS application system

Last year, there were 3-4 major changes in the statistical rate of unemployment due to legal changes (by giving rights to life women who have been retired for more than 15 years at the Department) and it actually caused an increase in the unemployment rate from 10% to 20%. This indicates the increase in the number of users of the system ZZZCG, and thus the requirements for maintenance and better system performance.

All employees of the IT service of the Institute work conscientiously and maximum within the possibilities of the budget and the available resources. System in given conditions it works, but it neatly lists the organizational problem in maintaining and upgrading the system is there is considerable lack of educated personnel in the IT service. In fact, there are currently only seven engineers who maintain all 25 organizational units, in addition, the budgets are too small for the further development and modernization of the system.

Regular number of people in the IT service is too small-this is the risk

- System engineers: 1 for central services, 7 for 25 of the Bureau
- Software engineers: 1 (database administrator)

The life cycle of application solutions is finished and all the solutions are the legacy and although they work neatly, there are a number of risks that are typical for the legacy systems and them is necessary to address. Organization of the work is good under the circumstances and the framework of the budget for a given but recommendation is certainly provide more employees in the IT services and boost budget.

Maintenance of the system and system upgrade procedures are planned and executed in accordance with the needs of the institutional needs, process and directed by legislative changes via open tenders.

Domain

The existing information system is now centralized and based on Microsoft technology. The past system consisted of more than one sub-domain, but it is now single domain **zzzcg.me** with 25 + 1 Organizational units.

Inventory and Asset management

System employs Inventory and Asset management solution based on custom development. Every computer is equipped with the software client that loads up and scans the client at the startup of the system and then sends collected data to the central server. Information being sent contains data regarding overall system information such as type of the computer, version of the operating system, installed software, licenses, serial numbers and other relevant data to the server. Technology of data exchange based on the HTTP protocol.

However, there is no systematic centralized management of computers, which would enable centralized software deployment, maintenance and inventory monitoring using a tool such as Microsoft System Center Configuration Manager (https://www.microsoft.com/en-us/ cloud-

platform/system-center-configuration-manager-comparison) or similar.

Help Desk - Reports Page 1 of 2

Reports

Computer Type	Total	%
Hewlett-Packard HP Compaq dc5700 Small Form Factor	48	12.7%
Hewlett-Packard HP Compaq dc5100 SFF(EJ628EA)	36	9.5%
LENOVO 90C2007SYB	36	9.5%
LENOVO 10HS002GMT	33	8.7%
Intel DG41WV	28	7.4%
Hewlett-Packard HP Compaq 6000 Pro MT PC	14	3.7%
Hewlett-Packard HP Compaq 6000 Pro SFF PC	13	3.4%
Hewlett-Packard HP 250 G3 Notebook PC	13	3.4%
Hewlett-Packard HP Compaq 6200 Pro SFF PC	12	3.2%
Hewlett-Packard HP Compaq dx2200 MT	10	2.6%
Hewlett-Packard HP dx2000 MT(PE197EA)	9	2.4%
System manufacturer System Product Name	9	2.4%
Hewlett-Packard HP Pro 3010 Small Form Factor PC	8	2.1%
Hewlett-Packard HP Compaq dx2300 Microtower	8	2.1%
Hewlett-Packard HP Compaq dc5800 Small Form Factor	7	1.8%
Compaq Presario	7	1.8%
Hewlett-Packard HP Pro3500 G2 MT PC	7	1.8%
Hewlett-Packard HP Pro3500 Series	6	1.6%
Hewlett-Packard HP ProDesk 405 G2 MT	6	1.6%
Hewlett-Packard HP d330 uT(DG289A)	6	1.6%
LENOVO 80T7	4	1.1%
LENOVO 80L0	3	0.8%
Hewlett-Packard HP Compaq dx2400 Microtower	3	0.8%
Compaq Evo D310	3	0.8%
Hewlett-Packard HP 255 G3 Notebook PC	3	0.8%
GBT___ AWRDACPI	2	0.5%
Gigabyte Technology Co. Ltd. H81M-S	2	0.5%
Hewlett-Packard HP Compaq dx6120 MT(EU408ES)	2	0.5%
Hewlett-Packard HP NetServer	2	0.5%
Hewlett-Packard DSDT_PRJ	2	0.5%
Hewlett-Packard HP Compaq dc7800 Small Form Factor	2	0.5%
Hewlett-Packard HP d330 DT(DC580AV)	2	0.5%
LENOVO 80N4	2	0.5%
LENOVO 20206	2	0.5%
HP ProLiant DL140 G2	2	0.5%
HP ProLiant DL360 G6	2	0.5%
Hewlett-Packard HP ProBook 450 G2	2	0.5%
Hewlett-Packard HP ProBook 4730s	1	0.3%
Hewlett-Packard HP Vectra	1	0.3%
Hewlett-Packard HP Pro 3400 Series MT	1	0.3%
HP ProLiant ML310e Gen8 v2	1	0.3%
HP ProLiant DL320e Gen8	1	0.3%
HP ProLiant DL360 G5	1	0.3%
Lenovo 921673G	1	0.3%

Figure: A report on computer type from the Intventory Management Application

Sizing of the existing system

EAM system is OLTP system heavily relied on Relational Database Management System (RDBMS) based on Microsoft SQL Server System.

- Databases:
  - The main LMIS database size is about 6-7 GB (the central base of LMIS is the largest one), but there are additional databases occupying up to 7-8 GB.
  - Platform used: SQL Server 2012 Standard Edition
  - Server:
    - CPU with 4 cores,
    - RAM: 20 Gb
- Performance management:
  - The performance of the system is actively monitored and systematically optimized by:
    - Analysis of execution plans and applying appropriate adjustments
    - Indexing and query optimization (re-indexing is applied every fifth working day)
    - Shrinking of database files when needed (regular checking's)
    - Average number of the batch requests per seconds **150-200**
    - Monitoring the operation of the system with SQL trace for errors and deviations; automatically notifying the administrators
- Total number of possible concurrent users: **350 users**
  - Peak load time during the day 08-11 hrs and 12-14 hrs

LMIS core modules

All LMIS modules are currently sufficient for most of the tasks, and they are still maintained, but there is a mix of several generations of software, based on unsupported and deprecated Legacy Microsoft technology stack technologies date back to 2000. Later on in the document I will elaborate on the reasons why is it important to upgrade the system as there are several reasons including lack of official support, lack of patching and security risks, it's much harder to find vendors who could still support and maintain this stack (and for considerable price).

Unemployed Register module

Legacy desktop application written in Microsoft Visual Basic 6.0. Equipped with automatic upgrade for simpler deployment.

Job Vacancies module

Legacy web application written in Microsoft ActiveX Document technology, heavily limited to Internet Explorer version 6 web browser (released in 2001) working only on Windows XP operating system (released in 2001)

Other application modules are legacy web applications based on Microsoft Classic ASP (Active Server Pages) 3.0, VBScript and JavaScript:

- Individual Professional Plan,
- Unemployed Benefits,

- Employers register
- Helpdesk application – envisioned as a centralized tool for error logging but is not yet operational

Unemployed benefits

- Legacy web based solution written in Classic ASP 3.0 and JavaScript. It enables the implementation of a process of handling unemployed benefits, handling their requests, issuance of a legal solutions provided by lawyers, generating payment orders.

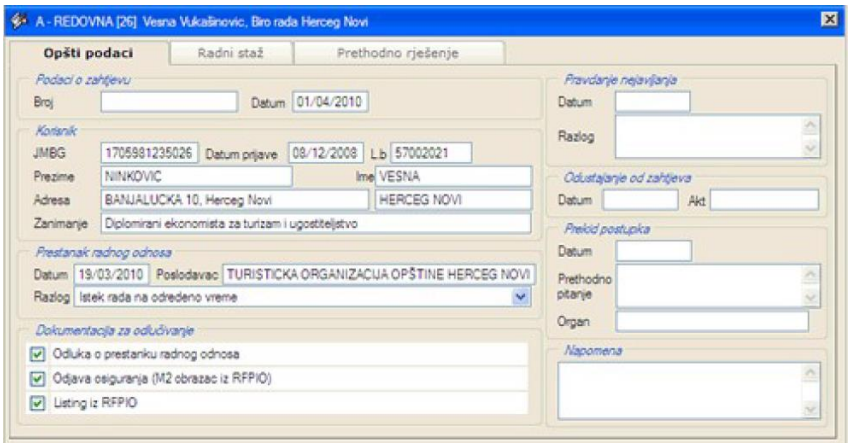


Figure: Unemployed benefits general information screen

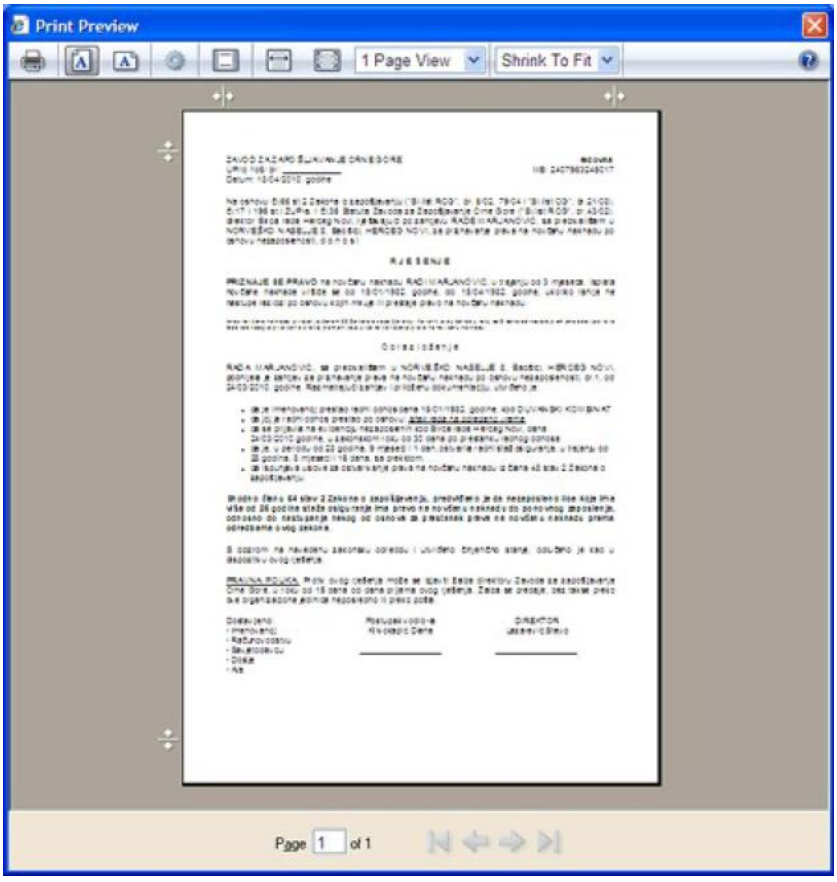


Figure: Unemployed benefits printing solution

Reporting and Analytical System

- Reporting Application module is custom developed solution in Classic ASP 3.0 and JavaScript
- Each report is based on information provided by the SQL Server Stored Procedure stored in the targeted database (mainly the LMIS database)
- The solution provides suitable user interface for choosing desired report
- Once selected it allows for the entrance of the required parameters
- It is possible to add and categorize new reports as well (but each report requires corresponding Stored Procedure stored in the database)
- The resulting dataset can be exported to Excel format
- There is a graphical presentation of the data (based on JavaScript library)
- There is centralized error handling and alerting if some processing of report breaks
- Total number of reports: 100-200 reports (not all of the reports are used, and there are many redundant ones)
- Business Intelligence solution based on ETL and Data-Warehouse platform does not exist but it is one of the goals of the future system

Internet presence

- EAM public website is outsourced to an internet presence provider company and it is based on the WordPress CMS technology
- It is mainly presentational site with static content
- There is no interactive functionality aimed at the unemployed or the employers e.g. there is no registration, login and personalized part of the site although there are visible buttons but they do not work as the functionality is not implemented

Document Management System

- Document Management system is not implemented
- There are template based documents generated in the system (e.g. application for handling unemployed benefits provide digital documents that are generated in the system based on the templates, but later these are printed out in accordance with the legislation, signed and , seals and log
- There is an archive of documentation and it is outsourced to a private vendor (Knjaz archive) but there is no subsequent direct electronic access to the documentation

Audit and Error logging

- There is a custom developed centralized system for recording and automatic logging of handled and unhandled errors in the system.
- In the case of the occurrence, the user receives a notification on the screen while in parallel, administrators receives an email notification

E-Learning System

- eLearning solution or system is not implemented
- administrative module (currently in development process) is equipped with a simple knowledge base, repository of technical and user documentation and FAQ section

Records Management

- Records management system (protocol) is not implemented
- Documentation is tracked only on paper and the office business is regulated at the State level
- In the context of the EAM information system, record management is not covered electronically

HR

- Custom HR solution is in place but it is not integrated or in the scope of LMIS

User Administration / ITSM

- User administration and management subsystem is realized as ASP 3.0 custom application
- It is centralized system of assigning roles to users
- It works independently of directory services and it is by no means integrated with the underlying Active Directory LDAP
- Users need additional account in order to access the applications
- Passwords are stored in clear text and are visible to main administrator
- Part of the administration subsystem is Asset/Inventory management tool which collects information about the computers on your network, on the basis of an agent that is installed on particular computer
- There is a simplified ITSM (IT Service Management) subsystem based on a ticketing system (in final stages of development) that would allow for the electronic submission of issues, opening, tracking and closing tickets, tasks assignment and monitoring of overall task management, performance and basic statistical processing

Survey Management

- It used to be carried out by surveying employers but the last ten years does not conduct

Intranet groupware / collaboration tools

- There is no collaboration platform in place (such as Microsoft SharePoint) and there is no centralized document share

Data Exchange

- **MLSS (Ministry of labor and social welfare)** - an EAM web service has been implemented which checks whether a person is registered and which benefits it has. The Web service is located on the internal web server. It was written in ASP 3.0 and data is in XML format. Communication is done through a closed government network.
- **The Ministry of public administration** (ex. The Ministry for information society) - implemented ALMP program for internship without employment by providing funds for the employers. The system checks whether candidates in the competition are eligible for the program due to their status on the Bureau and whether they meet required conditions.
- **Tax administration** – two-way communication for consolidated tax collection providing information regarding the change of the person unemployment status due to health insurance (obsolete now) and information about unemployed benefits

Testing Environment

- Testing environment: there is a testing database and a testing server, on which the system engineers are doing alpha testing;
- End users are not doing testing on the testing environment – they are doing beta testing on the production (but before each deployment, production is backed-up with the ability to restore to a previous version)

Security Policy

Formal document named "ZZZCG Security Policy" does not exist (yet), but it is on the roadmap, and there are already several documents dealing with security topics, including specifications and procedures regarding user account management, network security etc. Further security policy procedures shall be written and tied together as formal Security Policy document.

E-Mail System

- E-mail is based on outsourced service accessed via web-mail
- The use of standard tool such as Microsoft Office Outlook and is not systematic or regulated and depends on the affinities of the user

High Availability

- System is based on single server and high availability is not implemented

Backup and Data Archive

- Main system (including databases) is backed up on a daily basis
- In case of data loss or a system failure, it is only possible to return to the state of the previous day;
- Recommendations for the improvement of the process by introducing Log Shipping has been mentioned and would be further discussed
- Record History is implemented for the modules where there was a business need to do so (i.e. the history of changes of residence is not saved, because this information is not crucial for LMIS functioning).
- Data Archiving is not implemented

Antivirus and malicious programs protection

- There is centralized Antivirus Solution Kaspersky with 99 available licenses (which is not sufficient for all of the computers)
- Regular updates of the AV definitions databases are synced on daily basis
- Free version of Malwarebytes program is used for the removal of malicious/adware programs

Update / patching of the system

- All updates on the OS is done manually since there is no centralized methods and procedures in place

Bandwidth

- Intranet bandwidth is limited to ADSL 2 Mbit and total of 8 Mbit centrally through a government network (provide by Orion provider)
- There are independent ADSL internet connections for offices, but there is no direct connection between internal and external networks due to security reasons

Hybrid Cloud / Virtualization readiness

- Hybrid-cloud and cloud based solutions would be interesting primarily for the purposes of the backup if the legislation would allow for such practice (e.g. keeping backups in the cloud)

Source Code Repository

- Source Code of the applications is stored and located on disks and servers within the system, there is no systematic source control management (e.g. GIT, TFS etc.)

Workshop #2: Insight into existing EAM application system

Analysis of the existing application modules of EAM LMIS and their coverage of the business processes included:

- Registration of unemployed persons and jobseekers
- Regulation of the status of unemployed persons
- Time management (scheduling interviews and workshops)
- Professional profiling
- Creating an Employment plan
- Job Vacancies
- Mediation (finding candidates, referral of candidates, tracking of outcomes) with job matching
- Register of Employers
- Unemployment benefits
- ALMP Measures
- Administration of roles, rights and users
- Codebooks and standards for occupations (ISCO, etc.), vocations, educational programs, and the education degrees;
- Connections and integrations with other subsystems, accounting subsystem, document management system, records management, accounting and financials, HR etc.

Unemployed persons register (ENL)

- **Technical features:**
  - Desktop application written in Visual Basic 6.0
  - The main screen resolution is limited to 800 x 600 pixels
- **Functionality and supported use cases / business processes:**
  - Module enables the application process and the registration of unemployed persons
  - Search engine (based on filters)
  - Records management with data entry, updating, deleting etc.
  - Regulation of status: active (logged on), passive (logged out)
  - Residence and domicile - only the current state is preserved
  - Code book management - central for all systems
  - For the purposes of mapping EURES data according to the ISCO standard, beneficiary sent codebooks in Excel format
  - Catalogue of occupations SKZ (standard classification of occupations) is used and it is harmonized with the EU in terms of coding and nomenclature which makes it valid for the preparation of EURES integration
  - Degree of Vocational Education is based on NKO (national classification of education), corresponding to the ISCED 2011
  - Additional knowledge (foreign languages, driving tests, examinations, and other data)
  - Interest in applying for ALMP (SOP-vocational training and retraining)
  - Cate an individual plan of employment (IPZ), print and signature (of the contract)
  - Other factors of employment-administered additional security access to data in order to protect sensitive data
  - family,
  - professional rehabilitation,
  - disability,
  - There is a psychologist
  - and various difficult factors of employment

- Benefits/Rights during unemployment
  - health care (it is no longer in use)
  - an insight into the requirements of LV-tax administration is competent for NN is evidence that the employer pay contributions,
- Work experience-there's no merged electronic work booklets, ZZZCG has its own copy of the data resulting from a rewriting of the booklet
- There is no process of regular monthly briefings

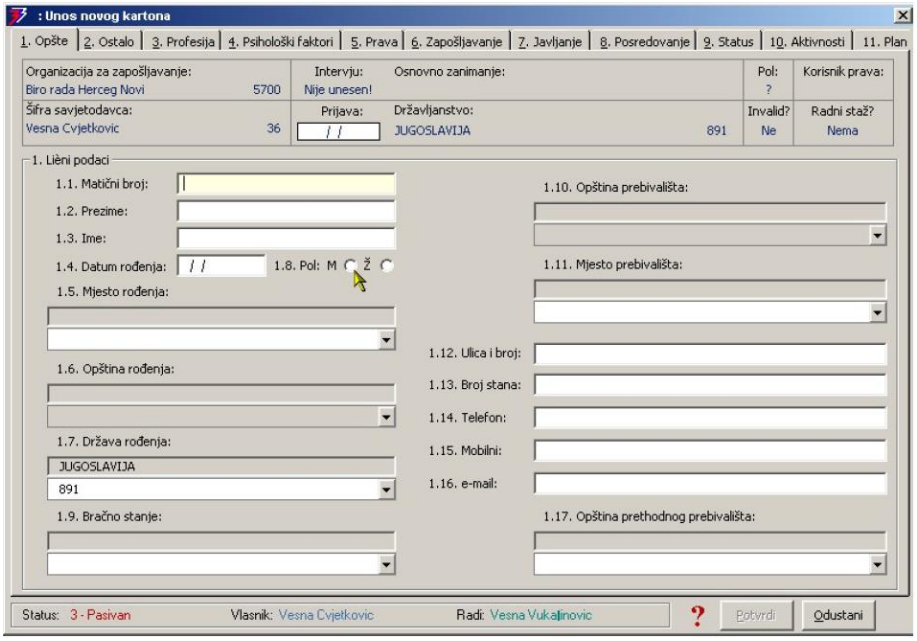


Figure: Screenshot of current ENL application

Module for Employers / Job Vacancies

- **Technical features:**
  - Web application written in Microsoft Classic ASP 3.0 and JavaScript
- **Functionality and supported use cases / business processes:**
  - Module enables the process and the registration of employers and job vacancies
  - **Core attributes:**
    - Job Title (descriptive field)
    - Occupations based on SKZ (standard classification of occupations, harmonized and valid within the EU based on ISCO)
    - The number of executives
    - Working type: Full time job / half-time job
    - Employment type: Temporary / Full employment
    - Place of work
    - Required Experience
    - Age
    - Education (Minimal required educational degree); Average Grades
    - Required knowledge and skills (IT literacy, languages etc.)
    - Competencies
    - Professional terms
    - Additional benefits: Accommodation / Transpiration / Meals
    - Proc. rating (which is expected by the employer)
- **Services provided to Employers:**

- Mediation is a key process and role of Employment Service in addition to classic administrative / bureaucratic approach
- Creation of candidates list through the process of mediation including:
  - selection / preselection of candidates
  - defining the deadline for candidacy
  - delegation of the candidates – locally or state wide
  - recording the results (outcome)

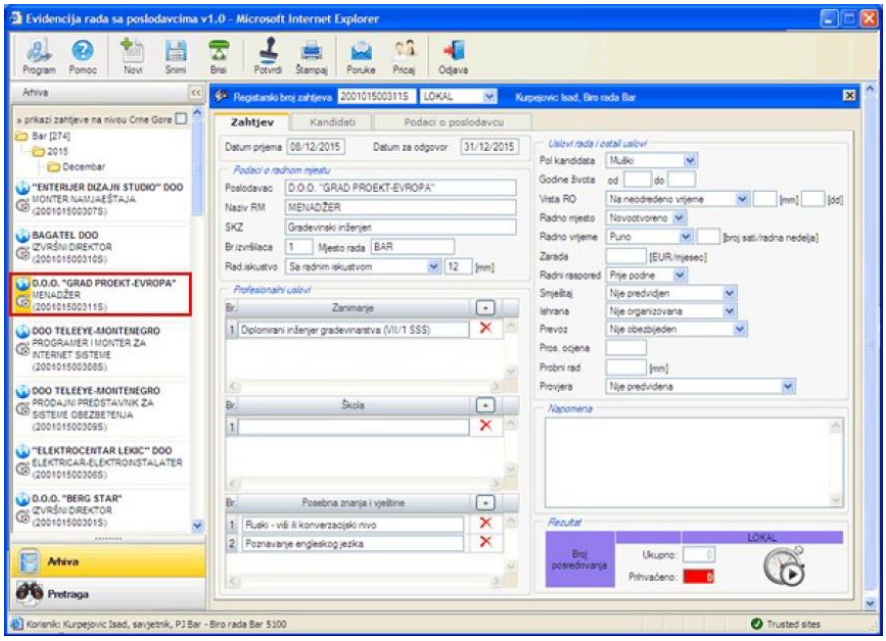


Figure: Employers and Job Vacancy module

Job Vacancies Application (SRM)

- **Technical features:**
  - There is a separate legacy Active-X Documents based applications which works only in Internet Explorer 6 version, without access to the source code of the application
- **Functionality and supported use cases / business processes:**
  - Provides a more detailed listing of vacancies
  - It is primarily used to generate a newsletter bulletin for the media and Bulletin Board

Employer Registry

- **Technical features:**
  - Web application written in Microsoft Classic ASP 3.0 and JavaScript
- **Functionality and supported use cases / business processes:**
  - The register of employers was initially taken from the Tax Administration, and it is manually updated when needed for the purpose of job vacancies (successively)
  - *www.crps.me* is the web page from which the data is being downloaded
  - General information about employers
  - Employer activities
  - Contacts – only those which cannot be obtained from the tax administration

Active Labour Measures - SOP (Vocational training and retraining)

- **Technical features:**
  - Web application written in Microsoft Classic ASP 3.0 and JavaScript
- **Functionality and supported use cases / business processes:**
  - Managing and defining Projects > Measures > Programs as default hierarchy of the ALMP
  - Organized measures according to the target groups - Defining requirements for candidates for inclusion (target group)
  - Defining initiator of the measure: EAM or employer
  - Defining program properties: quota, duration (dates from-to)
  - Finding candidates through ENL
  - Monitoring of realization of measures
  - Financing measures: Budgeting and planning the funds at the level of the year
- **Modalities of the ALMP programs / projects:**
  - measures for acquiring new skills,
  - public works,
  - prevention of the black market,
  - preparation for the new job / employment,
  - education of assistants in teaching / professional assistants
  - loans for self-employment (it has different Microsoft Access 97 Database Application)
  - and others
- **The basic process flow**:
  - EAM creates measures and the annual work plan
  - EAM publishes the programs
  - Employers apply for certain measures
  - EAM evaluates and decides regarding the launch of the projects
  - EAM is contracting the employers (contracts are generated in the system)
  - EAM monitors the realization and fulfillment of program measures, and at the end of the program it closes the case
  - In the case of a breach of contractual obligations legal service takes over the activities
  - Payment orders are generated and sent to the depository business (via separated application independent from the LMIS-a)
  - Payment orders are processed and sent to the Bank for payment (funds are taken from State Treasury)

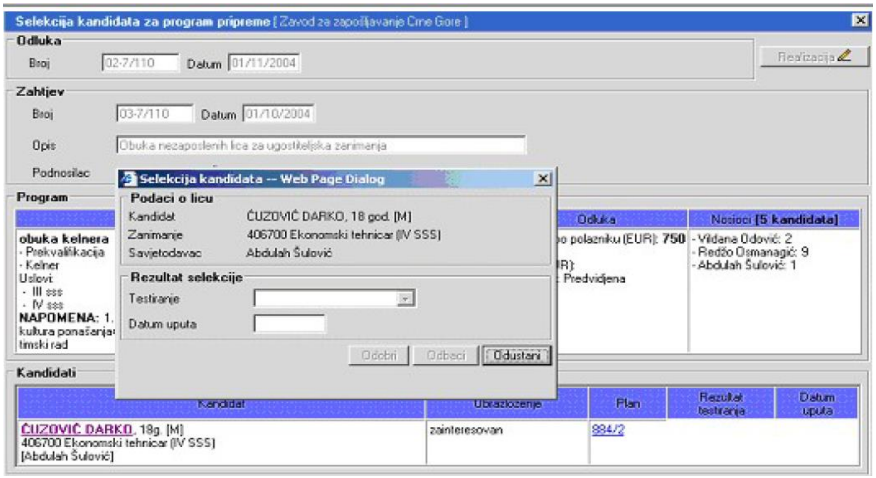


Figure: screenshot of current ALMP application module

Workshop #3: Introduction to EURES and requirements towards Employment Services

The goal of this workshop was to familiarize beneficiaries with the EURES system and the requirements that Employment Services should met.

Introduction

- **EURES** is a network of public employment services of the Member States of the EU, EEA and Switzerland
- Employment Services have advisory and informative role through the inclusion in EURES network (currently over 1000 advisors / counselors in the EU):
    - Counseling and providing information on rights, duties, taxes, protect against fraud, working permits (although EU basic premise is Job Mobility, work permits are still required for Austria, the Netherlands, Slovenia and Britain and Northern Ireland)
    - Mediation in the EURES network
    - The realization of the EURES employment projects with the preselection procedures
- Each member state must implement an EURES endpoint allowing for the data exchange with EURES

The services provided by EURES portal

- **Services for jobseekers**
    - Extensive offer of open job positions from 32 European countries
    - Publication of Curriculum Vitae making it visible to employers, advisers and HR consultants
    - Consultation and providing information (by EURES Advisers)
    - Communication channel for direct communication with the potential Employer
    - Providing Information on living and working conditions in the Member States
    - Drop'pin@Eures – a set of services aimed at increasing employability through education, retraining and various internships

- **Services for employers**
    - Offering Job Vacancies in 32 European countries
    - Announcing and publishing the need for workers in EU countries via Job Vacancies
    - consultation and providing information to employers
    - helping and providing professional services in the selection procedure of the candidates
    - participating and organization of job fairs
    - communication and mediation with candidates

Getting ready for the EURES

- National Employment Services need to ensure certain technical settings and capabilities in order to fulfill requirements of establishing an EURES endpoint
- It is necessary to prepare action plan for the data integration with the EURES network and to allow for publication of information on the EURES Web Portal based on data stored in LIMS:
    - Job Vacancies (JV)
    - Job Seekers Profiles (JSP)

- The system has to work in 24x7x365 availability mode. There is Jira ticketing system which provides ability to announce planned downtimes required for the system upgrades or patching
- According to New Regulation, there is also requirement for the functionality of uploading data from private employment agencies including JV's and JSP's and sending them to the EURES – this feature requires additional endpoint available on-line in order to provide the electronic service (e.g. web-service or Restful API) which agencies could use to send their data. EAM, as a gateway to EURES has unique position in Montenegro to define the structure and rules how to approach and use such a service.
- There's also a need to plan the publishing foreign JV's on EAM web portal (e.g. under the section EU jobs)

Data preparation for the EURES

- Preparation of the data should be driven and harmonized with extensive available documentation on EURES technicalities since detailed technical documents are freely available online to all member states
- Data format used for data exchange is XML format based on HR Open standard
- The model as technical minimum defines minimal data set of JV's and JSP's, but it could get quite extensive, however most of the fields are optional
- Classification of the data layers is color coded as displayed in the following figure:
  - Green (mandatory data fields)
  - Yellow (optional data fields)
  - White (not in use and are ignored at the moment, but they would not matter if sent)
- All the data should be encoded in accordance with EURES reference data codebooks (which is provided in separate Excel workbook), that especially important for occupations and skills

	EURES Conformant layer			EURES optional layer		HR-Open Standards optional layer
	EURES technical minimum	EURES conformant mandatory	EURES conformant optional			
Description	Elements that are mandatory for technical acceptance of the message.	Elements that are needed to EURES and should be there.	Elements that are needed to EURES but could not be filled for business reasons.	Optional entities for the EURES model.		Elements that EURES does not need but the ES could need the information for their needs.
Graphical representation						
Cardinality	1/1..n	1/1..n	0..n	1/1..n	0..n	
Target users of this layer	EURES platform (involved in Matching)	EURES platform (involved in Matching)	EURES platform (involved in Matching)	EURES platform (displayed only) + PES and PRES applications		Rest of the world
Treatment of the lack of values	The XML will be rejected.	Lack of data will be stored with a flag of non-conformance. A conformance score will be obtained including the % of unfilled values.	If data are not received it will not be penalised. But if data are provided and the information is missing it will be flagged as bad quality. A conformance score will be obtained including the % of unfilled values within the ones that are provided.	If they are not received it will not be penalised, but if they are received they will be considered. Lack of data will be stored with a flag of bad quality. A quality score will be obtained including the % of unfilled values.		The data will not be stored.
Examples of elements in this layer	Jobseeker given name	Contact address and education	"Work experience" can be empty in a CV for someone that had no job before.	Photo or availability dates		Recruitment status

Figure: Classification of EURES data layers

Overview of data flow in EURES

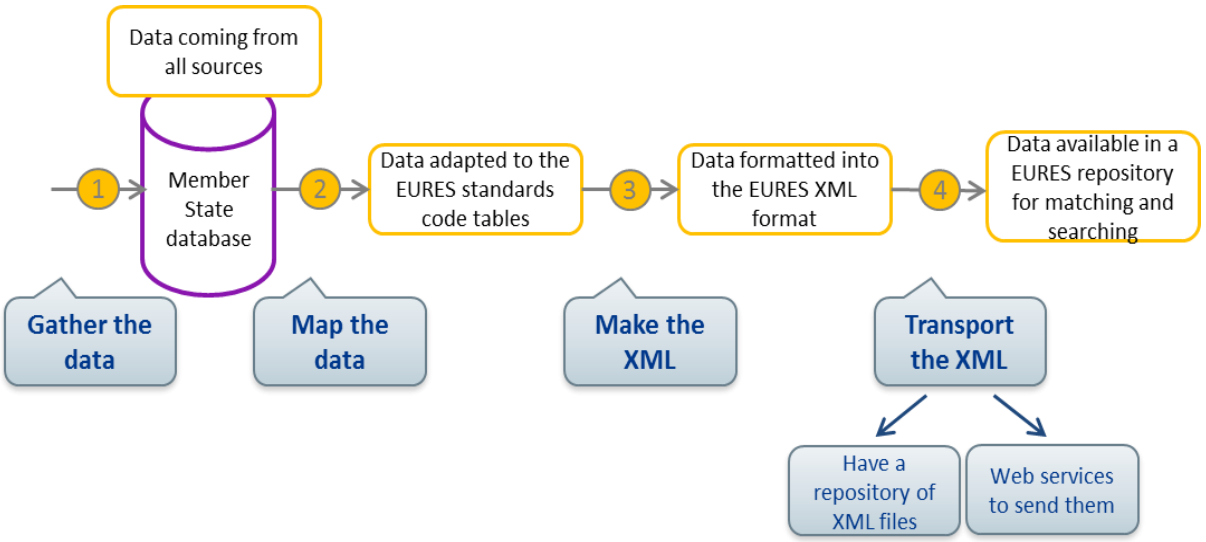


Figure: Data Flow in EURES

- Data flow from EAM to EURES could be divided in following steps:
  - 1. **Gathering** the data through standard core business processes of Employment Service (registration of unemployed, registration of Job Vacancies etc.)
  - 2. **Storing** the data in structural manner in the database (Member state database)
  - 3. **Mapping** the data in accordance with EURES proposed standards
  - 4. Data **adaptations and transformations** needed for successful conversion of the data to proposed XML format
  - 5. **Creation** of the XML data
  - 6. **Transport** of the data by means of established and secured communication channel between EAM and EURES (over the internet)
  - 7. **Acceptance and publishing** of the data on EURES portal (controlled by EURES)

Proposed implementation

- Although there are quite a few ways to implement EURES endpoint to Employment Service Information System, for the sake of simplicity and rather quick setup, EURES has prepared readiness kit called "**NCO Default Implementation Modules**" (DIM) which is definitively the easiest and recommended way to approach the implementation
- DIM cover most (if not all) necessary requirements that EURES puts in front of any member state.
- DIM consists of "*black box*" approach, where several ready-made application modules are already stacked in-place and ready to be installed on prepared application server providing services for the most complicated and most challenging part of the integration which is converting, mapping and preparing data, connecting to EURES web service and submitting it
- Elements of DIM stack are:
  - **DB converter** – a module that queries source LMIS database for JV & JSP data via prepared SQL view. It is assumed that this view would already return data in accordance with specific
  - **Intermediate Repository** – is a proxy/caching database used by the DIM modules, there is no need to intervene here

- **NCO input API** - a module that provides client connectivity to EURES web services. NCO input API module operates over internet using encrypted and secured HTTPS protocol, and allows for safe and timely data transfer from EAM to EURES.

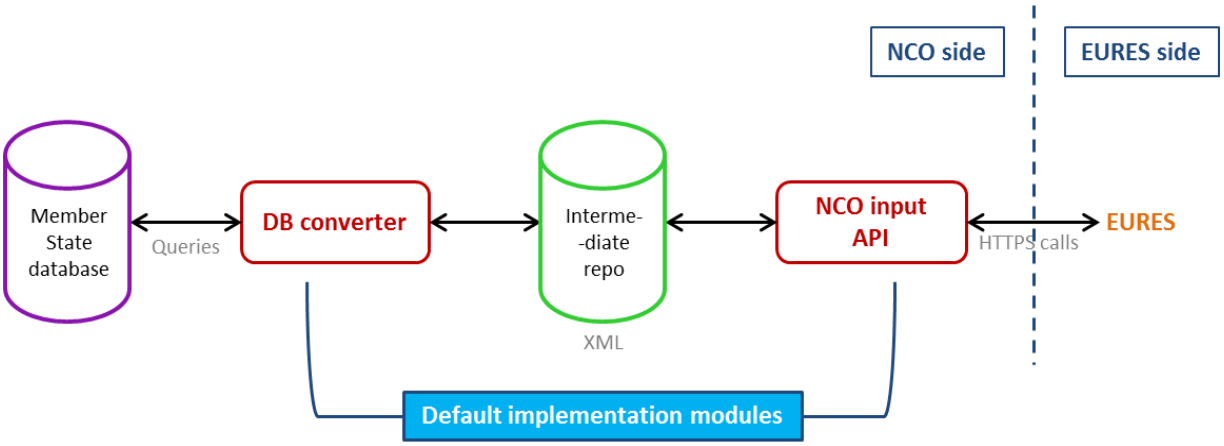


Figure: NCO Default implementation modules for integration with EURES

- **Technical requirements for preparation DIM stack are:**
  - **Prepared server** based on Linux or Windows operating system (preferably Windows Server) located in EAM's network, placed in DMZ in order to be able to access the internet. Standard internet ports (80 HTTP and 443 HTTPS - SSL / TLS) had to be opened and accessible for inbound and outbound network traffic. Server could be prepared
  - **Apache Tomcat** Java Application Server, an open source implementation of the Java Servlet, Java Server Pages, Java Expression Language and Java Web Socket technologies, which works on both Linux and Windows platforms. Tomcat is required to run application modules DB Converter and NCO input API, and can be downloaded here: https://tomcat.apache.org/
  - **MySQL Community Server** – used for intermediate repo. SQL DDL for creation of database is already prepared so it is simple to crate the database; another databases are already supported (e.g. PostgreSQL, Mongo DB). MySQL could be downloaded here: https://dev.mysql.com/downloads/
  - **Java Runtime Environment –** standard Java package needed in order to operate Java software and packages. Java Database Connectivity (JDBC) drivers for targeted database have to be installed (in the case of EAM that would be Microsoft SQL Server drivers), available here: https://java.com/en/download
- **Administrative requirements:**
  - In order to get access to EURES, EAM has to enroll for EURES, but this is purely administrative procedure. EAM has to install DIM and send internet enabled URL address where local DIM is installed. In reciprocity, EURES will provide URL, username and password for accessing the testing environment (NCO Debug Tool) and will add particular country to the list of data providers.

NCO Debug Tool

- NCO Debug Tool is useful for testing connectivity and validity of the data transferred to EURES side. It is implemented as a pull-service, allowing for the data request on demand. It pulls the data from the DIM module on the EAM site, on a push of a button. This way it is mimicking EURES automation, which operates once the integration is completed. In order to have access to the tool, this conditions need to be met:
    - EAM DIM service URL has to be registered on EURES side
    - EAM DIM service should have implemented functionalities for JV and/or JSP data request and mapping to LMIS database
    - EURES team has to provide URL, username and password of the debug tool

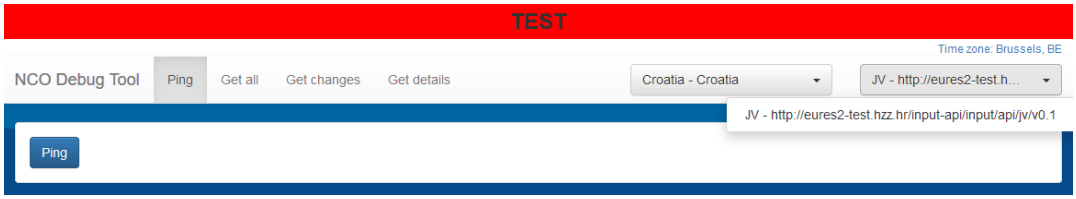


Figure: NCO Debug Tool for testing connection with EURES

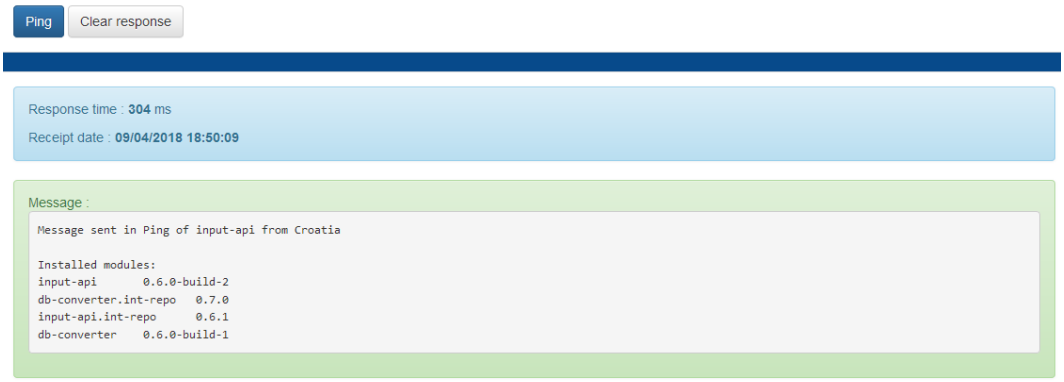


Figure: Testing the PING method – confirming that connection was successful

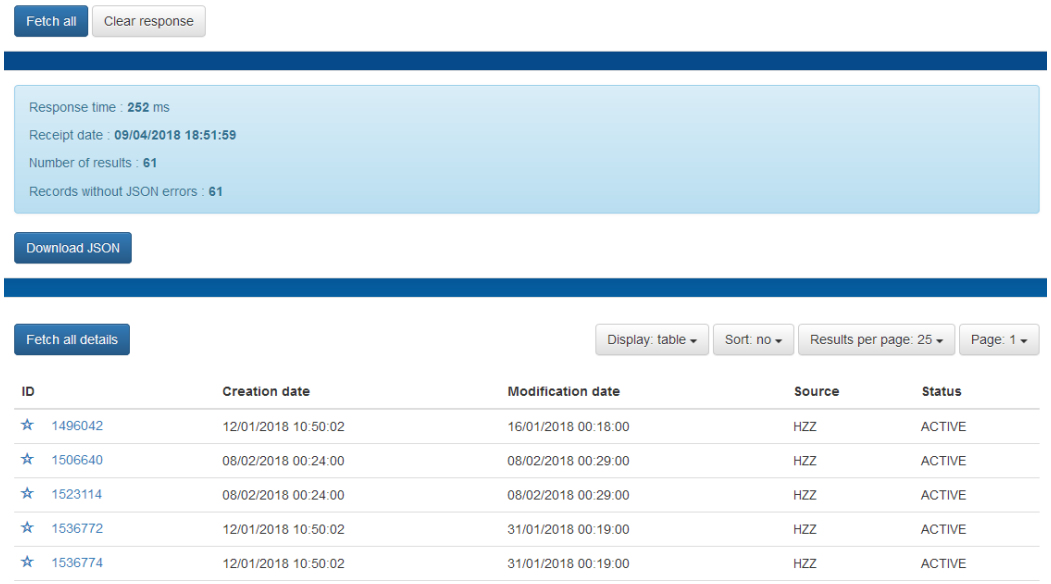
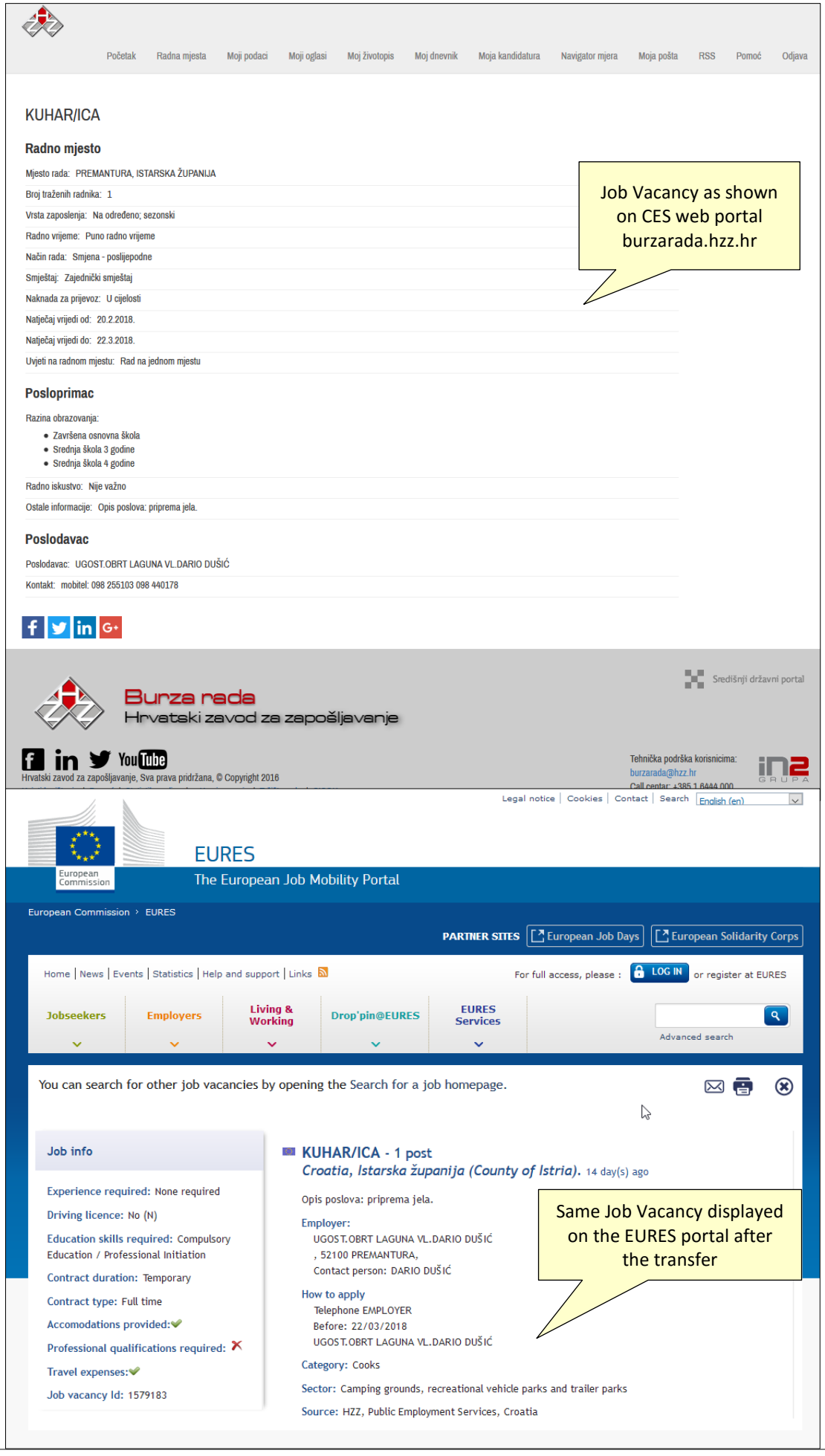


Figure: Fetching Job Vacancies from CES

Key internet resources on EURES

- EURES web portal (itself is the great resource of all information): https://ec.europa.eu/eures
- New Regulation EC (official Eur-Lex portal): http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:2016:107:TOC
- Official YouTube channel (very informative): https://www.youtube.com/channel/UCP1_uHOvjVxtXvenwaPapZw
- EURES Adviser Database (whole EU): https://ec.europa.eu/eures/eures-apps/um/page/public?lang=en#/adviser/search/list
- Croatian Employment Service information and experience in EURES (It's in Croatian language and most of Croatian experience could be useful to EAM as well): http://www.hzz.hr/default.aspx?id=10286
- New regulation official documents provided by DG EMPL: https://www.dropbox.com/sh/8mrlqmrnq0kijge/AAA1hRRF7r2hTW8Cx2qFHH_Za/New%20Regulation?dl=0
- NCO default implementation functionalities-v0.81: https://www.dropbox.com/sh/8mrlqmrnq0kijge/AABii2Uskd91sldcUccViL6Ra/New%20Regulation/Documents/Default%20implementation%20new%20regulation?dl=0&preview=NCO+default+implementation+functionalities-v0.81.docx
- Document with detailed specifications of the JV: https://www.dropbox.com/sh/8mrlqmrnq0kijge/AAAE2UBAytzimEuv9dPcGi9Ya/New%20Regulation/Documents?dl=0&preview=EFSS_v1.3.1_part_1_JV-v1.01.docx
- Document with detailed specifications of the JSP: https://www.dropbox.com/sh/8mrlqmrnq0kijge/AAAE2UBAytzimEuv9dPcGi9Ya/New%20Regulation/Documents?dl=0&preview=EFSS_v1.3.1_part_2_JSP-v1.01.docx


Početak
Radna mjesta
Moji podaci
Moji oglasi
Moj životopis
Moj dnevnik
Moja kandidatura
Navigator mjera
Moja pošta
RSS
Pomoć
Odjava
KUHAR/ICA
Radno mjesto
Mjesto rada: PREMANTURA, ISTARSKA ŽUPANIJA
Broj traženih radnika: 1
Vrsta zaposlenja: Na određeno; sezonski
Radno vrijeme: Puno radno vrijeme
Način rada: Smjena - poslijepodne
Smještaj: Zajednički smještaj
Naknada za prijevoz: U cijelosti
Natječaj vrijedi od: 20.2.2018.
Natječaj vrijedi do: 22.3.2018.
Uvjeti na radnom mjestu: Rad na jednom mjestu
Posloprimac
Razina obrazovanja:
Završena osnovna škola
Srednja škola 3 godine
Srednja škola 4 godine
Radno iskustvo: Nije važno
Ostale informacije: Opis poslova: priprema jela.
Poslodavac
Poslodavac: UGOST.OBRT LAGUNA VL.DARIO DUŠIĆ
Kontakt: mobitel: 098 255103 098 440178
Job Vacancy as shown on CES web portal burzarada.hzz.hr
Burza rada
Hrvatski zavod za zapošljavanje
Središnji državni portal
Hrvatski zavod za zapošljavanje, Sva prava pridržana, © Copyright 2016
Tehnička podrška korisnicima:
burzarada@hzz.hr
Legal notice | Cookies | Contact | Search | English (en)
EURES
The European Job Mobility Portal
European Commission
European Commission › EURES
PARTNER SITES
European Job Days
European Solidarity Corps
Home | News | Events | Statistics | Help and support | Links
For full access, please :
LOG IN
or register at EURES
Jobseekers
Employers
Living & Working
Drop'pin@EURES
EURES Services
Advanced search
You can search for other job vacancies by opening the Search for a job homepage.
Job info
Experience required: None required
Driving licence: No (N)
Education skills required: Compulsory Education / Professional Initiation
Contract duration: Temporary
Contract type: Full time
Accomodations provided:
Professional qualifications required:
Travel expenses:
Job vacancy Id: 1579183
KUHAR/ICA - 1 post
Croatia, Istarska županija (County of Istria). 14 day(s) ago
Opis poslova: priprema jela.
Employer:
UGOST.OBRT LAGUNA VL.DARIO DUŠIĆ
, 52100 PREMANTURA,
Contact person: DARIO DUŠIĆ
How to apply
Telephone EMPLOYER
Before: 22/03/2018
UGOST.OBRT LAGUNA VL.DARIO DUŠIĆ
Category: Cooks
Sector: Camping grounds, recreational vehicle parks and trailer parks
Source: HZZ, Public Employment Services, Croatia
Same Job Vacancy displayed on the EURES portal after the transfer

Workshop #4: Analysis of IT infrastructure and records processes at a more detailed data level with the aim of defining compliance with EURES requirements

Analysis of current IT infrastructure

Current servers in the EAM data-center

- **Main Applications Server**
  - Type: HP ProLiant DL140 G2, 2 x CPU
  - RAM: 4 Gb
  - OS: Microsoft Windows Server 2000
  - Roles:
    - hosting web applications
    - hosting files for auto-update of the ENL application

- **Main production Database Server**
  - Type: HP ProLiant DL360 G6,
  - RAM: 20 Gb
  - OS: Windows 2008 Server R2
  - Database: MS SQL Server 2008 R2 Enterprise
  - Memory management:
    - 14 Gb of RAM dedicated for SQL server (6,5 Gb databases, and the rest for the cache of the execution plan
  - Backup regimes:
    - Log Shipping
    - Full daily backup
  - Largest database is one containing data from the tax administration 7 Gb

- **External Applications Server**
  - Type: HP ProLiant DL320e Gen8,
  - RAM: 16 GB
  - OS: Microsoft Windows Server 2012 R2
  - Database: Microsoft SQL Server 2012 Standard
  - Roles:
    - Automatic backup and restore feature
    - Web services for external users (based on the Microsoft Classic ASP 3.0)

- **Application Server for integration with Tax Administration:**
  - Type: HP 6000 SFF (desktop PC),
  - RAM: 4MB
  - OS: MS Windows Server 2008,
  - Roles: interoperability to tax administration - implemented custom application for the data exchange (Microsoft .NET)

- **Domain Controller:**
  - Roles: Active Directory, Domain Name Services

Network characteristics and Network Security

- The overall topology of the network has not changed much since year 2000 (except that network technology has evolved from YuPak, over ISDN and MPLS to current modern network provided by Orion operator). System is centralized and there are 25 organizational units connecting to the central unit including CIPS centers (Centre for information and career advice)
- The network is internal and closed at the State level, so there is no need for additional firewall as all communication between organizational units is conducted inside closed network
- There are two network in use:
    - Main Network is a state level network with current bandwidth cap at 8/8 Mbits. (However, this is due to current contract and it is subject to change if more bandwidth is needed)
    - Secondary Network is a faster network (50/8 Mbit), and it is routed with MikroTik sophisticated routing for all locations. It is used as cold stand by network (if main network fails, minimal gateway configuration is needed to provide business continuity) and for Internet and interoperability purposes.
- There is no DMZ for the purpose of internet exposed web-services
- All local area networks in EAM premises are connected with optic fiber to the central

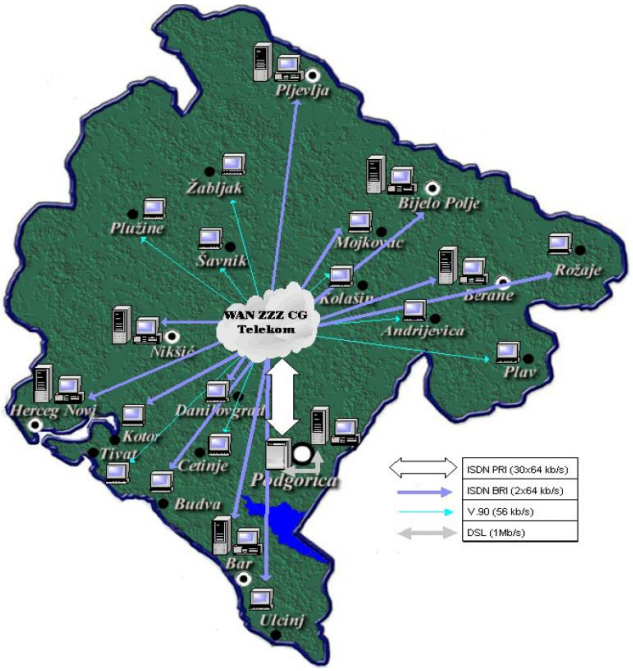


Figure: Centralized EAM network with its organizational units

Internet Services

- EAM main web-site is outsourced to a hosting provider and it is based on WordPress CMS
- There is no functionality or interactivity for the customers (Unemployed or Employers)
- There is no encryption of the traffic on the web (No SSL/TLS) – this is something that has to be addressed (State Post Office is a Certificate Authority in MNE); Usage of SSL/TLS is low in Montenegro as gov.me and euprava.me sites don't require SSL/TLS by default;

Backup Strategy and Procedure

- Current backup strategy is based on a daily backup cycle. In the case of interruption of the service or a server malfunction, there would be a significant data-loss since last available backup contains the state from the previous day. This could be addressed by implementing a Log Shipping feature although there is a trade off as that might degrade overall performance. In fact, Log Shipping has been tested but it is not implemented.
- There are no system-state backups or server images backups or snapshots, so in a case of a server failure, a

Data Center

- Location:
  - Data center is located in Podgorica EAM Central Unit on a ground floor in a building with apartments and residences above
- Disaster recovery:
  - There is no DR site
- Security:
  - The room is secured with the lock and access is controlled
- Cooling:
  - inverter with automatic restart
- Uninterruptable Power Supplies (UPS):
  - 2xHP R3000XR
  - 1xHP R/T3000
  - Tested quite often
  - Autonomy: 15 minutes, just enough to gracefully perform shutdown sequence

Client workstations

- There are 379 workstations, and most of them are older models (54%) with unsupported Windows XP as the OS. All of Workstations are Windows based.
- Most of web applications aren't compatible with newer web-browsers, so there is need to keep the older versions in order to use the applications
- SRM app (Job Vacancy module) requires Internet Explorer v6.0 since it works with obsolete ActiveX document technology

@OperatingSystemType@	Total	%
Microsoft Windows XP Professional	206	54.4%
Microsoft Windows 10 Pro	47	12.4%
Microsoft Windows 8.1 Pro	35	9.2%
Microsoft Windows 7 Professional	24	6.3%
Microsoft Windows 7 Home Premium	23	6.1%
Microsoft Windows 7 Ultimate	14	3.7%
Microsoft Windows 8.1 sa uslugom Bing	6	1.6%
Microsoft Windows 10 Enterprise 2015 LTSB	6	1.6%
Microsoft Windows 2000 Advanced Server	4	1.1%
Microsoft Windows 10 Home	3	0.8%
Microsoft Windows Server 2012 R2 Standard	3	0.8%
Microsoft Windows Server 2008 R2 Standard	2	0.5%
Microsoft Windows 8.1 Enterprise	1	0.3%
Microsoft(R) Windows(R) Server 2003 Standard Edition	1	0.3%
MicrosoftÂ® Windows ServerÂ® 2008 Enterprise	1	0.3%
MicrosoftÂ® Windows Vistaâ„¢ Business	1	0.3%
Microsoft Windows 8.1 Single Language with Bing	1	0.3%
Microsoft Windows 8.1 with Bing	1	0.3%
Totals	379	100%

Figure: Report on the structure of Operating Systems installed on client workstations

Monitoring and optimization of operation of the system

- **Database Maintenance:**
  - Monitoring
    - Profiler Tool – used for tracing running queries and stored procedures
    - Idera Check – overall SQL health monitoring
    - SQL Sentry One Tool – analysis of query execution plans and overall health check
  - Maintenance:
    - By incident / reactive – there are approx. 3 deadlocks within a year
    - Preventive – re-indexing of the database, update of query statistics (and eventually file size shrinking if needed) is performed once a week each
  - Key parameters:
    - Wait: around 1 second;
    - Number of batch requests: max 200, average 100
  - Conclusion:
    - EAM applies good practices for keeping database operations and performance in a good shape

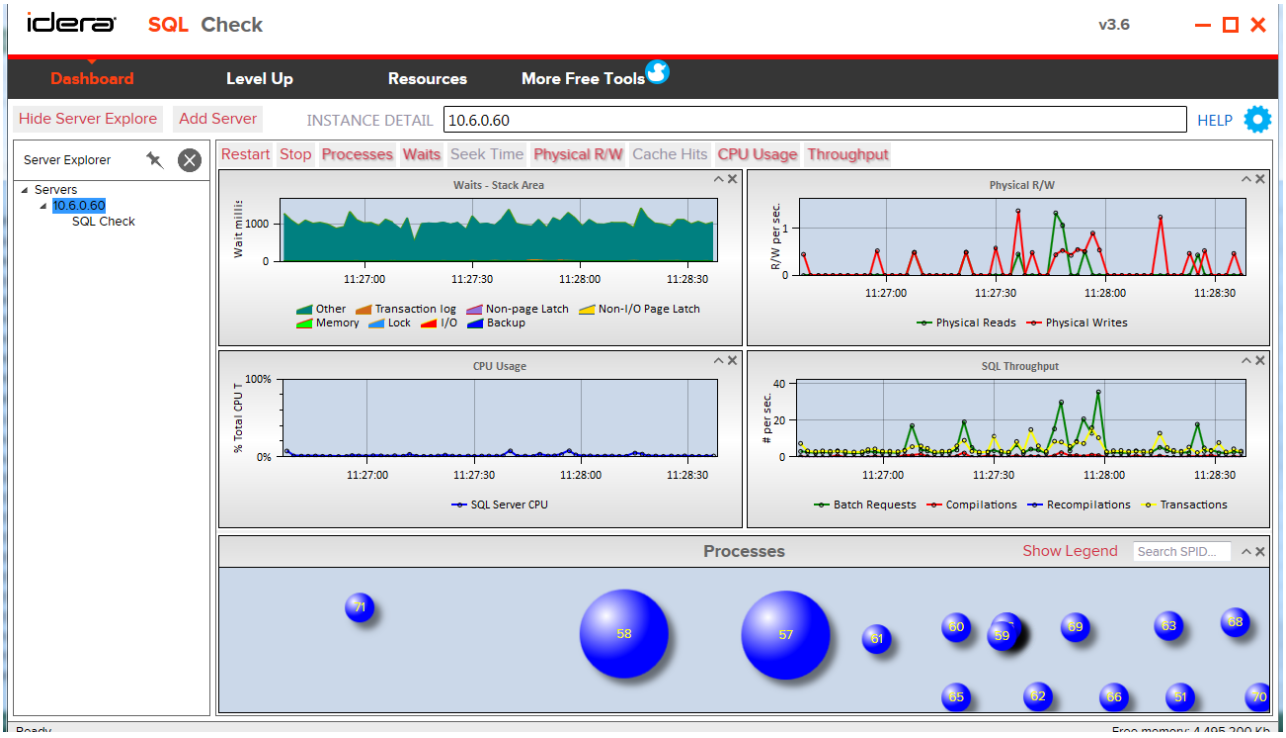


Figure: Idera SQL Check used for monitoring SQL Server performance

Tip upita	Broj upita	Broj%	Dura. [sec]	Dura. %	CPU%	Reads	Reads%	Writes	Writes%
1. SELECT	415.445,00	92,62	1.927,76	71,11	88,96	103.808.499,00	84,73	48.115,00	57,69
2. INSERT	17.911,00	3,99	77,73	2,87	1,21	1.030.452,00	0,84	23.743,00	28,47
3. UPDATE	5.968,00	1,33	12,64	0,47	0,33	414.748,00	0,34	10.969,00	13,15
4. DELETE	5.733,00	1,28	53,39	1,97	0,08	28.308,00	0,02	414,00	0,50
COMMIT TRAN	3.344,00	0,75	23,51	0,87	0,01	0,00	0,00	0,00	0,00
REPORTS	56,00	0,01	613,55	22,64	9,23	17.166.260,00	14,01	59,00	0,07
TOTAL	**448.530,00**	**100**	**2.711,15**	**100**	**100,00**	**122.515.725,00**	**100,00**	**83.400,00**	**100,00**

Figure: Statistics of SQL operations on daily basis

Analysis of current application system

All current applications are implemented as web applications and are based on legacy, deprecated and unsupported platform Microsoft Classic ASP 3.0 (and Active X Document) except for the ENL, which is desktop application written in Visual Basic 6.0 and application for integration with Tax Administration, which is written using .NET Framework.

Current web stack is comprised of older HTML/CSS combinations, enriched with JavaScript and server side code written in VB Script, which communicates via Data Access Layer, based on ADO.NET with SQL Server Database. A lot of program logic is also written in Transact SQL and located in the database as stored procedures. However, applications are still maintained and occasionally upgraded with new functionalities.

Key characteristics of apps are:

- Low CPU load – good performance and stability of the apps with very few system halts or crashes
- No sophisticated application or performance monitoring in place
- Centralized administration of users (role based authorization)
- Automatic error logging and reporting
- Deprecated legacy technology

Application maintenance:

- Application errors are reported directly by end users along with screenshots and descriptions how to reproduce errors
- 1st level maintenance is mostly covered by the EAM maintenance/support team
- 2st and 3rd level maintenance is performed/outsourced to external contractors
    - contract has a fixed maintenance fee for adaptive and perfective maintenance but not to exceed the basic design of the application

Data structure of EURES Job Vacancy (JV)

- Job Vacancies are most long lasting and most frequently exchanged information on EURES. Although with New Regulation, new possibilities had arrived, including exchange of Job Seekers Profile and possibility to enrich Job Vacancy pool with third party JV's where EAM could act as a gateway.
- Regarding the data structure of JV, at least there are fifty data fields (attributes) contributing to sufficient and complete data set that should be transferred to EURES. According to the full specification, total number of possible attributes is much bigger, but JV would be ready for exchange even if the technical minimum were fulfilled.
- Some of the most important fields are:
    - Unique Identification (Unique ID of the JV taken from the LMIS)
    - Job title
    - Description
    - Place of work
    - Information about the employer
    - Occupation
    - Education (Degree)
    - Closure date
    - Required Skills and Specific knowledge
    - Benefits
    - Terms & Conditions
    - Salary
    - and other fields …

Here is the example of the SQL view with mappings for the Job Vacancy information based on the data stored in the LMIS. Please note that EURES JV fields are bolded:

```
SELECT
  -- Osnovni podaci o radnom mjestu
  [Unique_JV_ID] = cast(rm.RadnoMjestoID as nvarchar(100)),
  [jv_title] = rm.RadMjeNazivRadnogMjesta,
  [jv_eures_ref] = rm.RadMjeNazivRadnogMjesta,
  [jv_nat_ref] = rm.RadnoMjestoID,
  [Description] =
        case
        when replace (cast(rm.RadMjePosebnoOstalo as nvarchar(max)),'<BR />','')!='' then replace
        (cast(rm.RadMjePosebnoOstalo as nvarchar(max)),'<BR />',' ')
        when replace (cast(rm.RadMjeOpisPosla as nvarchar(max)),'<BR />','')!='' then replace (cast(rm.RadMjeOpisPosla
        as nvarchar(max)),'<BR />',' ')
        else replace (cast(rm.RadMjeNazivRadnogMjesta as nvarchar(max)),'<BR />',' ')
        end,
  [jv_STATUS] = 0,
  [JV_CLOSUREDATE] = cast(NULL as datetime2),
  [jv_country] = c.COUNTRY_CODE,
  [jv_region] = isnull(r.REGION_CODE, c.COUNTRY_CODE),
  [jv_date_creat] = cast(getdate() as datetime2),
  [jv_NB_POSTS] = rm.StvarnoTrazenoRadnika,
  [jv_isco] = s.SkuNKZsifra,
  [jv_nace] = isnull(map.NKD2002Sifra, cast(NULL as nvarchar)), -- ovo predstavlja NKD
  [EURES_FLAG] = cast(case when rme.RadnoMjestoID is not null then '1' else '0' end as nvarchar(1)),
  [JV_APPLICATION] =
  case
            when rm.RadMjePrijavaOsobniDolazak = 1 then 6
            when rm.RadMjePrijavaNajavaTelefon = 1 then 5
            when rm.RadMjePrijavaZamolba = 1 or rm.RadMjePrijavaEmail = 1 then 2
```

```
                when rm.RadMjePrijavaHZZRazgovor = 1 then 3 -- ??? ovo još treba provjeriti!!
                else 7 --cast(NULL as nvarchar)
               end, --'1', -- U šifarnicku C08 - Application method codes
[JV_Contact]=
case
when rm.RadMjePrijavaEmail = 1 and isnull(rm.RadMjeNacinJavljanjaEmail,'')!='' then rm.RadMjeNacinJavljanjaEmail
when rm.RadMjePrijavaNajavaTelefon=1 and
isnull(rm.RadMjeNacinJavljanjaNajavaTelefon,isnull(rm.RadMjeNacinJavljanjaNajavaMobitel,''))!='' then
isnull(rm.RadMjeNacinJavljanjaNajavaTelefon,rm.RadMjeNacinJavljanjaNajavaMobitel)
when (rm.RadMjePrijavaOsobniDolazak=1 or rm.RadMjePrijavaZamolba = 1) and
isnull(rm.RadMjeNacinJavljanjaZamolba,isnull(rm.RadMjeNacinJavljanjaOsobniDolazak,''))!='' then
isnull(rm.RadMjeNacinJavljanjaZamolba,rm.RadMjeNacinJavljanjaOsobniDolazak)
else rm.PosNaziv
end,
   --Poslodavac: --ovdje ima promjena
   [EMP_NAME] = rm.PosNaziv,
   [EMP_ADDR1] = isnull(
rm.RadMjeNacinJavljanjaZamolba,isnull(rm.RadMjeNacinJavljanjaOsobniDolazak,p.PosUlicaKucniBroj)),
   [EMP_POST_CODE] = m.MjePostanskiBroj,
   [EMP_CITY] = m.MjeNaziv,
   [EMP_COUNTRY] = cast(NULL as nvarchar), --'', ovo obilježje zasad ne pratimo
   [EMP_EMAIL] = isnull(rm.RadMjeNacinJavljanjaEmail,p.PosEmail),
   [EMP_CONTACT] = rm.RadMjeKontaktOsoba, -- ovo treba provjeriti
   [EMP_PHONE] =
isnull(rm.RadMjeNacinJavljanjaNajavaTelefon,isnull(rm.RadMjeNacinJavljanjaNajavaMobitel,p.PosTelefonBroj)),
   [EMP_FAX] = cast(NULL as nvarchar), --'', ovo ne pratimo
   --Pogodnosti:
   [CL_ACC] = case
           when rm.MogucnostStanovanjaID is NULL then cast(NULL as nvarchar)
           else
              case when rm.MogucnostStanovanjaID = 7 then 'N' else 'Y' end
           end, --as ACCOMMODATION, -- znači: "No", tj. smještaj nije uključen
   [CL_TVL] = case
           when rm.PrijevozNaRadID is NULL then NULL
           else
              case when rm.PrijevozNaRadID = 10 then 'N' else 'Y' end
           end, -- as TRAVEL,
   [CL_RLC] = NULL, --'N', -- as RELOCATION -- znači: nema pomoći kod preseljenja
   [CL_MEALS] = case
              when rm.MogucnostPrehraneID is NULL then cast(NULL as nvarchar)
            else
              case when rm.MogucnostPrehraneID = 7 then 'N' else 'Y' end -- as MEALS, jv.
            end,
   --Uvjeti:
   [JV_CONTRACT] = case
                when rm.RadMjeNacinZaposlenjaNeOdredjeno = 1 and rm.RadMjePunoRadnoVrijeme = 1 then  'PF'
                when rm.RadMjeNacinZaposlenjaNeOdredjeno = 1 and rm.RadMjePunoRadnoVrijeme = 0 then 'PP'
                when (rm.RadMjeNacinZaposlenjaOdredjeno = 1 or rm.RadMjeNacinZaposlenjaSezonac = 1) and
rm.RadMjePunoRadnoVrijeme = 1 then 'TF'
                when (rm.RadMjeNacinZaposlenjaOdredjeno = 1 or rm.RadMjeNacinZaposlenjaSezonac = 1) and
rm.RadMjePunoRadnoVrijeme = 0 then 'TP'
                when rm.RadMjeNacinZaposlenjaVolonter = 1 then 'TT'
                when rm.RadMjeNacinZaposlenjaPripravnik = 1 then 'TA'
                when rm.RadMjeNacinZaposlenjaHonorarno = 1 and rm.RadMjePunoRadnoVrijeme = 1 then 'XF'
                when rm.RadMjeNacinZaposlenjaHonorarno = 1 and rm.RadMjePunoRadnoVrijeme = 0 then 'XP'
                else cast(NULL as nvarchar)
              end,--'PF', -- U šifarniku C05 - Contract codes
   [JV_EDUC_CODE] =        cast(
           case -- U šifarniku C10 - Education level codes
```

```
            when (rm.RadnoMjestoTraziNSKONiziRazred=1  or rm.RadnoMjestoTraziNSKOVisiRazred=1  or
            rm.RadMjeRazinaZnanja1=1 or rm.RadMjeRazinaZnanja2=1) then 1 --Compulsory Education / Professional
            Initiation
            when rm.RadnoMjestoTraziNSKOSrednju=1 or rm.RadMjeRazinaZnanja3=1 then 2 -- Vocational Training /
            Apprenticeships
            when rm.RadnoMjestoTraziNSKOSrednjuDodatno=1 or rm.RadMjeRazinaZnanja4=1 then 3 --Higher Technical
            Training
            when rm.RadnoMjestoTraziNSKOVisaMagisterij=1 or RadMjeRazinaZnanja5=1 then 4 -- Advanced Technical
            Training
            when rm.RadnoMjestoTraziNSKODoktorat=1  or RadMjeRazinaZnanja6=1 or isnull(RadMjeRazinaZnanja7,0)=1 or
            isnull(RadMjeRazinaZnanja8,0)=1 then 5 -- Higher Training, Including Academic
            else 0
            end as nvarchar(1)), --promjena
[CL_EXP] = --'C', -- U šifarniku C07 - Experience needed codes
      case
         when rm.RadMjeNijePotrebnoRadIsk = 1 then 'A' -- "None required"
         else
            case
               when rm.RadMjeRadnoIskustvo is null then 'Y' -- "Required"
               when rm.RadMjeRadnoIskustvo > 0 and rm.RadMjeRadnoIskustvo <= 12 then 'B' -- "Up to 1 year"
               when rm.RadMjeRadnoIskustvo > 12 and rm.RadMjeRadnoIskustvo <= 24 then 'C' -- "Up to 2 years"
               when rm.RadMjeRadnoIskustvo > 24 and rm.RadMjeRadnoIskustvo <= 60 then 'D' -- "Between 2 and 5 years"
               when rm.RadMjeRadnoIskustvo > 60 then 'E' -- "More than 5 years"
            end
      end,
   [CL_DRV] =
      case
         when rm.RadnoMjestoTraziAkategoriju = 1 then 'A'
         when rm.RadnoMjestoTraziBkategoriju = 1 then 'B'
         when rm.RadnoMjestoTraziCkategoriju = 1 then 'C'
         when rm.RadnoMjestoTraziDkategoriju = 1 then 'D'
         when rm.RadnoMjestoTraziEkategoriju = 1 then 'E'
         when rm.RadnoMjestoTraziFkategoriju = 1 or rm.RadnoMjestoTraziGkategoriju = 1 or
rm.RadnoMjestoTraziHkategoriju = 1 then 'Y'
         else 'N'
      end, -- as DRIVINGLICENSE, -- U šifarniku C09 - Driving licence codes
   [CL_PRF] = case
            when NSKOid1 = 1 or NSKOid2 = 1 or NSKOid3 = 1 or NSKOid4 = 1 or NSKOid5 = 1
               or NSKOid6 = 1 or NSKOid7 = 1 or NSKOid8 = 1 or NSKOid9 = 1 or NSKOid10 = 1
               or NSKOid11 = 1 or NSKOid12 = 1 or NSKOid13 = 1 or NSKOid14 = 1 or NSKOid15 = 1
               or NSKOid16 = 1 or NSKOid17 = 1 or NSKOid18 = 1 or NSKOid19 = 1 or NSKOid20 = 1
               or RadMjeStrucniIspit = 1 then 'Y'
            else 'N'
         end, -- as Professional qualification
   [REQUIRED_LANGUAGE] = EURES.RequiredLanguages(rm.RadnoMjestoID), -- npr. FR-1|EN-3
   [JV_AGEMAX] = cast(NULL as nvarchar), -- as AGEMAX, jv.
   [JV_AGEMIN] = cast(NULL as nvarchar), -- as AGEMIN, jv.
   [JV_LASTAPPLICATION] = rm.RadMjeRokPrijave, -- 'dd/mm/yyyy') as LASTAPPDATE, jv.
   [JV_DATE_LM] = rm.RadMjeAzurirano, -- 'dd/mm/yyyy') as MODIFICATION_DATE, to_char(jv.
   [JV_STARTDATE] = cast(NULL as datetime), --'dd/mm/yyyy') as STARTDATE, to_char(jv.JV_ENDDATE, 'dd/mm/yyyy')
   [JV_ENDDATE] = cast(NULL as datetime), --datum kraja posla
   [JV_HOURSWEEK] = rm.RadMjeTjednoSati, -- as HOURSWEEK, jv.
   --Plaća:
   [JV_SAL_CURR] = 'HRK',
   [JV_SAL_MIN] = case
                  when ocekivanaplacaid = 0 then NULL
                  when ocekivanaplacaid = 1 then 0
                  when ocekivanaplacaid = 2 then 2000.0
                  when ocekivanaplacaid = 3 then 2500.0
                  when ocekivanaplacaid = 4 then 3000.0
                  when ocekivanaplacaid = 5 then 3500.0
```

```
                when ocekivanaplacaid = 6 then 4000.0
                when ocekivanaplacaid = 7 then 4500.0
                when ocekivanaplacaid = 8 then 5000.0
                when ocekivanaplacaid = 9 then 6000.0
                when ocekivanaplacaid = 10 then 7000.0
                else NULL
            end,
  [JV_SAL_MAX] = case
                when ocekivanaplacaid = 0 then NULL
                when ocekivanaplacaid = 1 then 2000.0
                when ocekivanaplacaid = 2 then 2500.0
                when ocekivanaplacaid = 3 then 3000.0
                when ocekivanaplacaid = 4 then 3500.0
                when ocekivanaplacaid = 5 then 4000.0
                when ocekivanaplacaid = 6 then 4500.0
                when ocekivanaplacaid = 7 then 5000.0
                when ocekivanaplacaid = 8 then 6000.0
                when ocekivanaplacaid = 9 then 7000.0
                when ocekivanaplacaid = 10 then NULL
                else NULL
            end,
  [JV_SAL_NG] = cast(NULL as nvarchar), --'N' , -- as SALARY_TAX, nvarchar bruto ili neto
  [JV_SAL_PERIOD] = cast(NULL as nvarchar), -- nvarchar
  [jv_isco2] = s.Skupina_Sifra_10, --dodano 26.02.2015. (NKZ 2010)
  [JV_MODIFICATION_DATE] = rm.RadMjeAzurirano,
  [DOC_ID_VALID_FROM] = rm.RadMjeRokPrijaveStart,
  [DOC_ID_VALID_TO] = rm.RadMjeRokPrijave
FROM ...
```

Data Structure of Current Job Vacancy in EAM LMIS

- Based on the insight into the structure of a current EAM database and corresponding table that collects data about free workplaces [Form1-WEB], conclusion is that required fields are already present in the current data set
- Implementation of coding system: instead of individual codebooks tables, system is based on one big table containing composite key comprised of *codebook type* and corresponding *value.* Because of such approach is a Foreign Key is considered to be composite and consists of a Type the codes and values of the codes.
- Data that is stored in Job Vacancy table:
    - ID (unique identificator)
    - Job Title
    - Type of employment
    - Duration
    - Type of the working place
    - Employer information
    - Is working experience required?
    - Number of working hours
    - Average grades required
    - Need for professional selection
    - Deadline for submission
    - Additional notes
    - Information about how to sign in (and the contacts)
    - and other relevant fields

- Conclusion is that technical minimum fields are present in the data set, although there is no data regarding 3rd party supplier of Job Vacancy. This is structure of the table containing the Job Vacancy data:

```
CREATE TABLE [dbo].[Obrazac_E1_WEB](
	[PrijavaBR] [varchar](13) NOT NULL,
	[BiroRada] [varchar](4) NULL,
	[DatPrijave] [datetime] NULL,
	[DatOglasa] [datetime] NULL,
	[PoslodavacID] [varchar](20) NULL,
	[BrIzvrsilaca] [smallint] NULL,
	[RMNaziv] [varchar](115) NULL,
	[SifEulRM] [varchar](10) NULL,
	[SifTipSEulRM] [varchar](5) NULL,
	[SIFMjesta] [varchar](5) NULL,
	[MjestoID] [varchar](10) NULL,
	[SIFRadIskustvo] [varchar](5) NULL,
	[RadIskustvoID] [varchar](10) NULL,
	[RadIskustvoMM] [smallint] NULL,
	[SIFPol] [varchar](5) NULL,
	[PolID] [varchar](10) NULL,
	[StarostOD] [smallint] NULL,
	[StarostDO] [smallint] NULL,
	[SIFRadOdnos] [varchar](5) NULL,
	[RadOdnosID] [varchar](10) NULL,
	[ROtrajanje] [smallint] NULL,
	[SIFRMstatus] [varchar](5) NULL,
	[RMstatusID] [varchar](10) NULL,
	[SIFRadVrijeme] [varchar](5) NULL,
	[RadVrijemeID] [varchar](10) NULL,
	[RMbrSati] [smallint] NULL,
	[RMzarada] [float] NULL,
	[SIFRadRaspored] [varchar](5) NULL,
	[RadRasporedID] [varchar](10) NULL,
	[SIFSmjestaj] [varchar](5) NULL,
	[SmjestajID] [varchar](10) NULL,
	[SIFIshrana] [varchar](5) NULL,
	[IshranaID] [varchar](10) NULL,
	[SIFPrevoz] [varchar](5) NULL,
	[PrevozID] [varchar](10) NULL,
	[Uspijeh] [float] NULL,
	[RMProbniRad] [smallint] NULL,
	[SIFProvjera] [varchar](5) NULL,
	[ProvjeraID] [varchar](10) NULL,
	[SIFTipPrijave] [varchar](5) NULL,
	[TipPrijaveID] [varchar](10) NULL,
	[RokPrijaveDD] [smallint] NULL,
	[SIFOsnBezOglasa] [varchar](5) NULL,
	[OsnBezOglasaID] [varchar](10) NULL,
	[Napomena] [nvarchar](max) NULL,
	[PotNacNema] [smallint] NULL,
	[SifTipSObrPri] [varchar](5) NULL,
	[SifObrPri] [varchar](10) NULL,
	[Promijenjen] [timestamp] NULL,
	[MjestoSelekcije] [varchar](100) NULL,
	[VaziDo] [datetime] NULL,
```

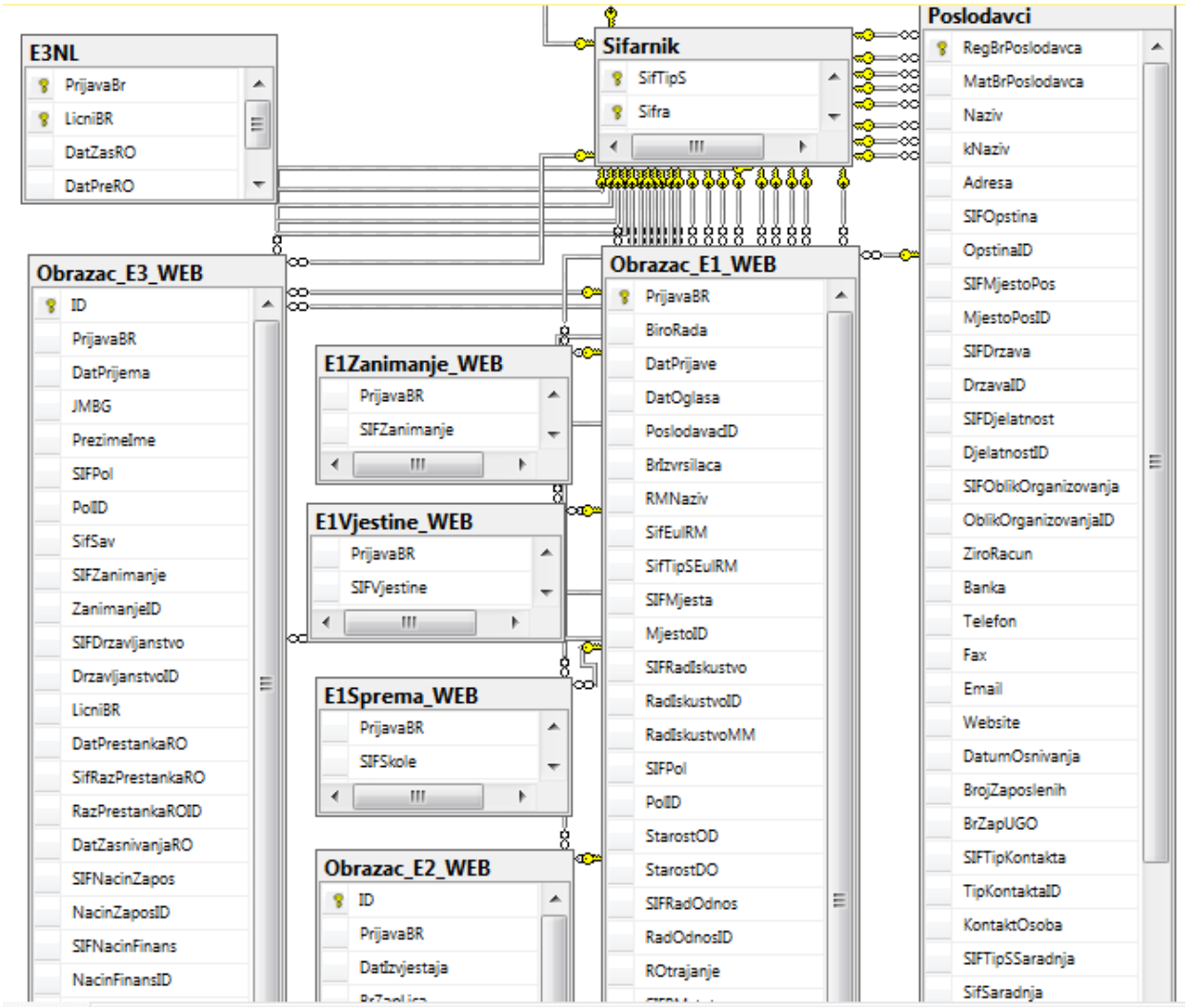


Figure: ER diagram of current Job Vacancy in EAM LMIS

Data Structure of EURES Job Seeker Profile (JSP/CV)

- Job Seekers profile comprises of several areas of essential fields although full list of all possible attributes is quite extensive.

- Essential information could be divided into following sections:
  - Candidate information
  - Desired Job
  - Work Experience
  - Education
  - Skills & Competencies
  - Language
  - Attachments (references)
  - CV Supplier (if the third party has provided to the CV)

- Based on official EURES documentation, list of essential Job Seekers Profile fields is as follows:

Job seeker profile ID
Private data indication
CV Supplier - Organization name
CV Supplier - Contact person given name
CV Supplier - Contact person family name
CV Supplier - Contact channel
CV Supplier - Contact type
CV Supplier - Phone country prefix
CV Supplier - Phone area prefix
CV Supplier - Phone number
CV Supplier - Address
CV Supplier - Building number
CV Supplier - Street name
CV Supplier - Unit
CV Supplier - City
CV Supplier - Region
CV Supplier - Country
CV Supplier - Postal code
CV Supplier - Link
Candidate - Given name
Candidate - Family name
Candidate - Contact channel
Candidate - Contact type
Candidate - Phone country prefix
Candidate - Phone area prefix
Candidate - Phone number
Candidate - Address
Candidate - Building number
Candidate - Street name

Candidate - Unit
Candidate - City
Candidate - Region
Candidate - Country
Candidate - Postal code
Candidate - Link
Candidate - Country of residency
Candidate - Nationality
Candidate - Birth date
Candidate - Gender
Candidate - Primary language
CV name
Desired start date
Immediate availability
CV summary
Desired job location - Region
Desired job location - Country
Desired occupation
Desired position type
Desired contract type
Work experience - Organization name
Work experience - Contact channel
Work experience - Contact type
Work experience - Phone country prefix
Work experience - Phone area prefix
Work experience - Phone number
Work experience - Address
Work experience - Building number
Work experience - Street name
Work experience - Unit
Work experience - City
Work experience - Region
Work experience - Country
Work experience - Postal code
Work experience - Link
Work experience - Sector
Work experience - Position title
Work experience - Start date
Work experience - End date
Work experience - Current
Work experience - Description
Work experience - Category
Education - School name
Education - Level
Education - Start date

Education - End date
Education - Description
Education - Degree name
Education - Major field
Driving license type
Skill type
Language skill
Skill level
Attachment - Content
Attachment - Link
Attachment - File Name
Attachment - File Type
Attachment - Title

- Functionality of JSP envisioned possibility to hide portions of CV containing personal information

- Due to complexity of Job Seekers Profile implementation, not all of the member states had implemented that functionality yet, but it is on the roadmap (at the time of writing, approximation is that around 50%). Essential functionalities should be provided via the web-portal with ability to create EuroPass CV and regulate which data structure

Data Structure of Unemployed Persons Record in EAM

- Although currently there is no capability of storing CV information inside EAM LMIS, as this feature is prerequisite for integration with EURES, this should be developed as a part of new system.

- However, in the current system there are data tables containing most of the data fields that would comprise a Job Seekers Profile. Following dataset corresponds to Job Seekers Profile in Eures:

Job Seekers General Information:

```
CREATE TABLE [dbo].[Nezaposleni](
	[LicBr] [varchar](10) NOT NULL,
	[DatPriNaEvi] [datetime] NULL,
	[RadStaDaNe] [bit] NOT NULL,
	[BrRadKnji] [varchar](9) NULL,
	[DatPri] [datetime] NULL,
	[KorPra] [varchar](2) NULL,
	[Pol] [varchar](1) NULL,
	[Inv] [bit] NOT NULL,
	[MatBr] [varchar](13) NOT NULL,
	[Pre] [varchar](25) NULL,
	[Ime] [varchar](20) NULL,
	[RadSta] [varchar](6) NULL,
	[DatRodj] [datetime] NULL,
	[UliIBr] [varchar](50) NULL,
	[BrSta] [varchar](5) NULL,
	[Tel] [varchar](12) NULL,
	[Mob] [varchar](12) NULL,
	[EMail] [varchar](50) NULL,
	[Nap] [text] NULL,
```

```
	[SifDrzRod] [varchar](10) NULL,
	[SifTipSDrzRod] [varchar](5) NULL,
	[SifOpsPre] [varchar](10) NULL,
	[SifTipSOpsPre] [varchar](5) NULL,
	[SifMjePre] [varchar](10) NULL,
	[SifTipSMjePre] [varchar](5) NULL,
	[SifOpsPrePre] [varchar](10) NULL,
	[SifTipSOpsPrePre] [varchar](5) NULL,
	[RasLic] [bit] NULL,
	[SifOrgZap] [varchar](10) NULL,
	[SifTipSOrgZap] [varchar](5) NULL,
	[SifZan] [varchar](10) NULL,
	[SifTipsZan] [varchar](5) NULL,
	[SifDrz] [varchar](10) NULL,
	[SifTipSDrz] [varchar](5) NULL,
	[SifSav] [varchar](10) NULL,
	[SifTipSSav] [varchar](5) NULL,
	[SifMjeRod] [varchar](10) NULL,
	[SifTipSMjeRod] [varchar](5) NULL,
	[SifOpsRod] [varchar](10) NULL,
	[SifTipSOpsRod] [varchar](5) NULL,
	[SifBraSta] [varchar](10) NULL,
	[SifTipSBraSta] [varchar](5) NULL,
	[SifVojOb] [varchar](10) NULL,
	[SifTipSVojOb] [varchar](5) NULL,
	[SifPrihvZap] [varchar](10) NULL,
	[SifTipSPrihvZap] [varchar](5) NULL,
	[SifPrihvRO] [varchar](10) NULL,
	[SifTipSPrihvRO] [varchar](5) NULL,
	[SifPrihvRV] [varchar](10) NULL,
	[SifTipSPrihvRV] [varchar](5) NULL,
	[SifSpremZap] [varchar](10) NULL,
	[SifTipSSpremZap] [varchar](5) NULL,
	[SifSpremOsp] [varchar](10) NULL,
	[SifTipSSpremOsp] [varchar](5) NULL,
	[SifTrijazaNL] [varchar](10) NULL,
	[SifTipSTrijazaNL] [varchar](5) NULL,
	[SifPozDiskr] [varchar](10) NULL,
	[SifTipSPozDiskr] [varchar](5) NULL,
	[CVshort] [text] NULL,
	[Ime1Roditelja] [varchar](150) NULL,
	[DjevPre] [varchar](150) NULL,
	[IdentDokVrsta] [varchar](50) NULL,
	[IdentDokDat] [datetime] NULL,
	[IdentDokBr] [varchar](50) NULL,
	[IdentDokOrg] [varchar](50) NULL,
	[SifNeTraziPosaoZbog] [varchar](10) NULL,
	[SifTipSNeTraziPosaoZbog] [varchar](5) NULL,
	[SifStaNez] [varchar](10) NULL,
	[SifTipSStaNez] [varchar](5) NULL,
	[SifRazPreVodjEviNez] [varchar](10) NULL,
	[SifTipSRazPreVodjEviNez] [varchar](5) NULL,
	[DatPreVodjEviNez] [datetime] NULL,
	[SifRazPosPreRadNez] [varchar](10) NULL,
	[SifTipSRazPosPreRadNez] [varchar](5) NULL,
	[JavObavez] [bit] NULL,
	[OdKadNeTraziPosao] [datetime] NULL,
	[DatCreated] [datetime] NOT NULL,
```

Occupation and Education information:

```
CREATE TABLE [dbo].[Zanimanje](
	[LicBr] [varchar](10) NOT NULL,
	[SifTipSZan] [varchar](5) NULL,
	[RBrZan] [smallint] NOT NULL,
```

```
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	[SifTipSTipZan] [varchar](5) NULL,
	[SifTipZan] [varchar](10) NULL,
	[RadIskUZan] [char](6) NULL,
	[RadStaUZan] [char](6) NULL,
	[SifSko] [varchar](10) NULL,
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	[DatDiplome] [smalldatetime] NULL,
```

Information on previous working experience:

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	[NazPos] [varchar](255) NOT NULL,
	[SifOps] [varchar](10) NULL,
	[RegBrPri] [varchar](13) NULL,
	[SifTipSOps] [varchar](5) NULL,
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	[SifTipSZan] [varchar](5) NULL,
	[SifRadOdn] [varchar](10) NULL,
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	[DatPreRad] [datetime] NULL,
	[SifNacZap] [varchar](10) NULL,
	[SifTipSNacZap] [varchar](5) NULL,
	[DuzRadSta] [varchar](6) NULL,
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	[SifTipSRazPreRad] [varchar](5) NULL,
	[SifZanTabZan] [varchar](10) NULL,
	[RegBrPoslodavca] [varchar](20) NULL,
	[ZahtjevBr] [bigint] NULL,
	[BrProg] [tinyint] NULL,
	[BrPlana] [int] NULL,
	[VerPlana] [smallint] NULL,
	[RBr] [smallint] NULL,
```

Information regarding special skills and competencies:

```
CREATE TABLE [dbo].[PosebnaZnanja](
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	[SifPosZna] [varchar](10) NULL,
	[RBrPosZna] [smallint] NOT NULL,
	[SifTipSPosZna] [varchar](5) NULL,
	[imaDiplomu] [bit] NULL,
```

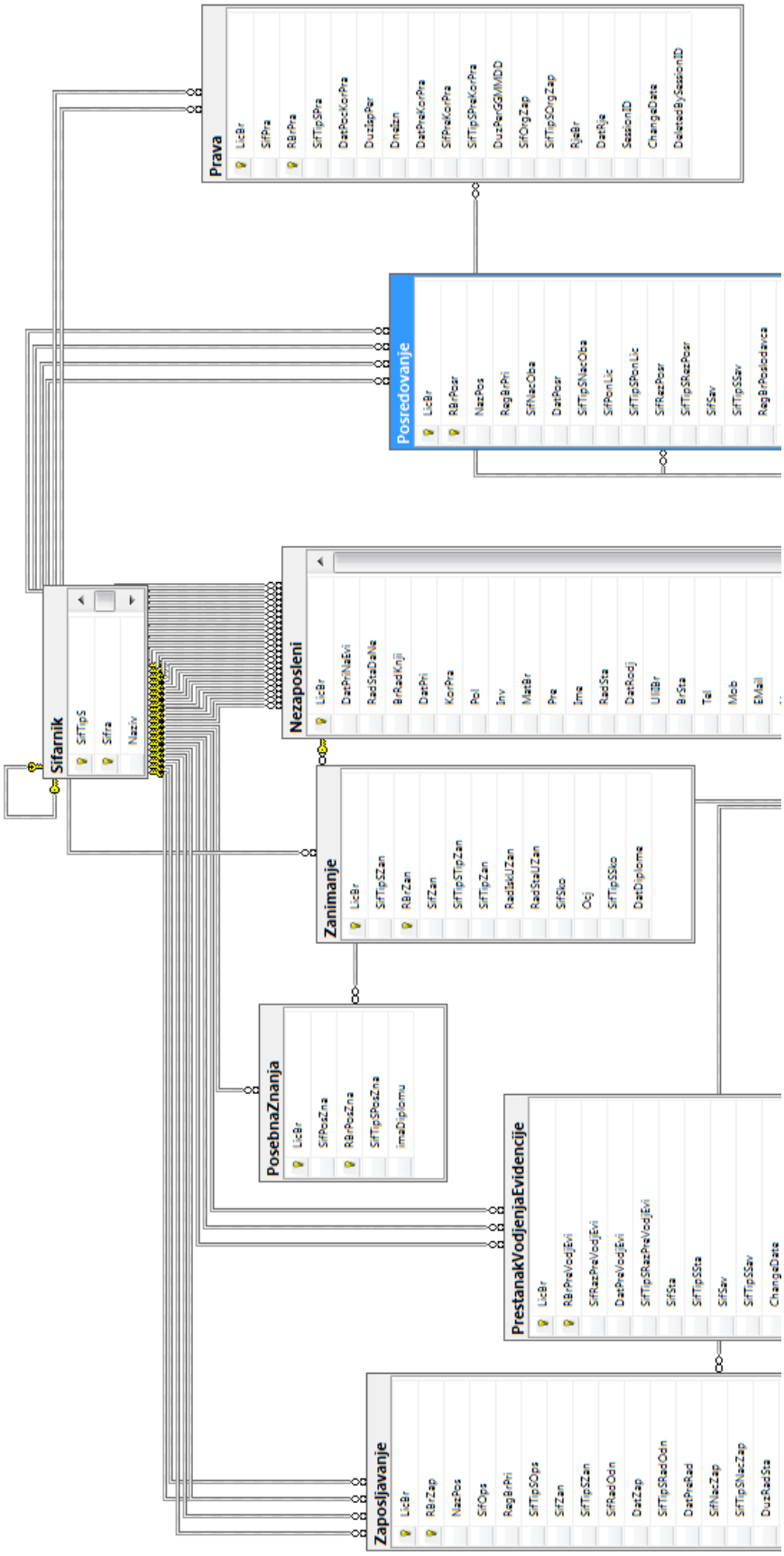


Figure: ER diagram of Unemployed Persons records (Job Seekers Profile)

Workshop #5: Conclusion of the Analysis Phase

- Review of the information collected, their accuracy, collecting and reviewing remarks, corrections and wrapping up the analysis phase
- Harmonizing desired structure of documentation and defining guidelines for further writing
- Collecting necessary documentation and information
- Agreement on the date of presentation of results and further dynamics
- Discussion on various topics such as:
    - pros and cons for Microsoft technology stack considering that the current system is based on MS stack, and central database is already Ms SQL Server
    - willingness to consider different technological approaches such as Open Source stacks such as PHP and PostgreSQL/MySQL
    - Minimizing costs by adopting open source office solutions such as LibreOffice / OpenOffice
    - Different aspect on new infrastructure including use of virtualization (Hyper-V, VMWare or other virtualization technology)
    - Detecting which of the building blocks of the future system are missing and what recommendations should be in place:
        - Use of BI / DWH subsystem for advance analytics
        - Single Sign On based on Active Directory
        - System and Configuration management improvements
        - Need for advanced web-portal for Job Seekers and Employers with ability to create CV online and post Job Vacancies
        - Requirements for the integration with EURES (DMZ zone, servers, technologies)

PLANNING A NEW LABOR MARKET INFORMATION SYSTEM

Introduction

The Montenegro's National Employment Service (EAM) is a public institution owned by the State of Montenegro, constituted under Law on mediation in employment and entitlements during unemployment, aimed at resolving employment and unemployment related issues in their broadest sense. EAM plays a leading role in the development of the Montenegro's labor market, particularly when it comes to balancing the total labor supply and demand aimed at increasing employment.

The main goal of this project is building a sophisticated Labor Market Information System (LMIS), which should be at the core of all business processes management aims.

LMIS is a complex information system and there is no product out of the box that could be bought on the market and ready installed. It combines features (not all of them, but rather some of them) of:

- Customer Relationship Management (CRM),
- Case Management,
- Document Management,
- Time Management,
- Records Management,
- Financials (elements of ERP),
- Grants Management,
- Web-portal extensions facing public customers,
- Integration with various institutions and 3rd party data providers and consumers,
- and other features

It also requires strong multi user role based centralized administration integrated with user directory, strong reporting and analytical capabilities (business intelligence).

Therefore, EAM information system is a modular and centralized system that covers the functionality of key business processes of the institute. It consists of custom and specifically developed application support that enables parallel work of more users (more than a thousand), deployed within more than one hundred and thirty organizational units.

Access centralization brings a number of advantages, including the availability of all real-time data, centralized data entry, data processing and storage, simpler system upgrades, greater manageability and scalability of the system, easier infrastructure and performance management with improved access control with a higher level of security.

Modularity of system architecture ensures easier functional expansion of the system and additional flexibility in the case of legislative and business-process changes, ensuring their compliance with legal regulations and regulations.

The use of web technology is the key technological feature of the system since it facilitates a combination of multiple generations and module performance in the form of a single system and significantly simplifies access to the most revered versions and system functionality.

The security of the system is defined by the EAM security policy and the software has been implemented on several levels, and it is managed through a centralized administration of users, their roles and the resulting rights.

The EAM is currently lacking internet presence in terms of online services provided to Job Seekers and Employers, and there is a strong emphasis on strengthening these capacities.

The arguments for modernizing the LMIS

The first version of the system was developed in 2001 and since then it has been maintained and upgraded with new modules, expanded functionality, and in some parts and technologically refreshed to provide the appropriate technological level required for normal operation of the system. However, through the analysis of the current state of the information system, realistic needs for complete redesign and business, process and significant technical upgrading of the application part of the system are recognized.

The aim of this modernization is to align the system with modern standards and needs that demand changes in the labor market dynamics through the adoption of new paradigms and alignment with changes in business processes themselves. This will result in more flexible and modern technological implementation, more powerful analytical tools, enabling job performance monitoring, capacity building and quality of service through further approaches to key system users: unemployed people, jobseekers and employers, as well as other stakeholders.

This complex task involves database redesign, complete reengineering and technological upgrading of most of the application support while modernizing the user interface. That part of software support has come to the end of its life cycle and needs to be reworked, with new technologies, adopting business logic and data structures that are established and support current business processes.

Such a comprehensive approach will provide an ideal opportunity for reengineering and optimization, and will allow for further advancement and linkage of existing processes to make the collection, storage, processing, analysis and application of data in day-to-day work more efficient, safer and timely.

Here, we will outline the key reasons and include the application modules (along with their business processes), which are made in older software technology and architecture, and as such are candidates for upgrading and deployment in newer technologies. The key reasons why it is necessary to overhaul the old application modules developed in legacy technologies are to replace the new ones:

- Lack of official support for the mentioned technologies (Microsoft technologies: Visual Basic 6.0, Classic ASP 3.0, MSDTC and COM +). Namely, extended support has expired in March 2008.
- The uncertainty as to when the Windows Server operating system will allow the old solution to work. In the version of 2012, the apps are working, but it is possible that the next version of the operating system will be disconnected from the required compatibility
- Development Tools (Microsoft Visual Studio) do not support older technology, which makes development and maintenance difficult

- There is no possibility of using more advanced architectures and paradigms in developing new solutions (such as pattern based design, unit testing and others) as well as the ability to apply modern frameworks (MVC, WCF, WebAPI, Angular, React etc.)
- Lack of engineers who know how to use and work with such technology because new generations are not familiar with the same and poor availability of materials on the Internet
- The lack of systematic source control should be addressed and fulfilled with a modern solution for source control with extended security and integration with modern development tools and Application Lifecycle Management paradigms (e.g. Team Foundation Server, GIT etc.)

- This always represent an excellent opportunity to revise, re-engineer/re-work and improve the business processes themselves, in order to achieve better integration with the environment, to achieve greater stability and scalability of the system, to better performance, and to generally exploit the benefits of modern technologies

- Extend the life span of the software for the next ten or more years (if we compare with the lifetime of the existing solution)

Purpose and General Objectives

Overall purpose of this project is to:

- Increase the quality of services provided by the EAM in order to stimulate workforce competition and address the labor market needs.

- Develop human potential and administrative capacity of the EAM in creation and provision of new services in the labor market.

- Earn the leading role of the EAM in the Montenegro's labor market by stimulating partnership and imposing the stronger influence on adopting and realizing public policies

The General Objectives of the project is to provide adequate ICT support through design and development of sophisticated LMIS solution that should be used operate and coordinate core daily operations in EAM.

The software is ought to be implemented in the Central office, County offices and Local branch-offices, covering whole Montenegro's territory providing access to more than 380+ concurrent users.

Expected Results and Goals

Expected goals and results that ought to be achieved in the context of new LMIS development project should be:

- Business process analysis backed up with necessary definitions and requirements based on workshops with end-users in order to ensure that all parts of the system would support current practices and legislation

- Simplification of daily tasks in terms of administrating and organizing information required by core business processes

- Analysis results should be documented in form of functional and non-functional specifications

- Providing a detailed definition of system technology and architecture that had to ensure efficient, robust, easy to use, secure, highly available and reliable application system which would support all functionalities defined in process analysis

- Development of new application modules and database elements including design, development, testing and deployment in accordance with changes in legislation and/or business processes in accordance to methodology outlined in Project plan and respecting project processes and terms defined in work plan
- Maintenance of existing application modules in terms of stable operation, optimization and performance gain in order to reflect the work load, changes in legislation, changes in business processes and other end user requirements

- Business process and data integration between modules and other systems through established and approved interoperability frameworks

- Data management and data-migration procedures ensuring the quality and accuracy of business data manipulation

- Ensuring stable and high performance OLTP (Online Transaction Processing) system

- Providing consultation, end-user education and training

- Providing technical and end-user documentation (user manuals)

- Project management and Quality control

- Maintenance of delivered application system during post-production system support

- Strong alignment with EURES goals and technical requirements

Functional Requirements

Overview of the core system components

Labor Market Information System (LMIS) is a complex information system consisting of several important building blocks (application modules/components). Future EAM LMIS should consist of various integrated application modules designed to support core business processes in secure and stable manner. Modules should be compliant with the Montenegro's legislative and practices in the scope of domain of Labor Market.

The LMIS Core Application Modules are the following:

- Unemployed and Job Seeker's Registry module (Lični karton nezaposlenog lica)
- Employers Registry module (Rad sa poslodavcima)
- Job Vacancy Registry Module (Evidencija slobodnih radnih mjesta)
- Mediation module
- Unemployed Benefits module (Izdavanje uvjerenja)
- Active Labor Measures Policies (ALMP) module
- Planning and Time Management module (Kalendar aktivnosti)
- Administration module (Authentication & Authorization, Auditing)
- Reporting, Statistics and Analytics modules (Statističko-analitičko izvještavanje, Pretraživanje i operativno izvještavanje)
- Internet Presence modules (web-portals)
- Filing and Records Department module
- Human Resources module
- Financials and Accounting module
- Data Integration and Interoperability modules
- Document Management Subsystem
- Performance Management Subsystem
- And other modules that will be determined as required part of the system during the thorough analysis including:
    - Centralna registracija obveznika i osiguranika (CROO)
    - Stručno osposobljavanje i priprema za zapošljavanje (SOP)

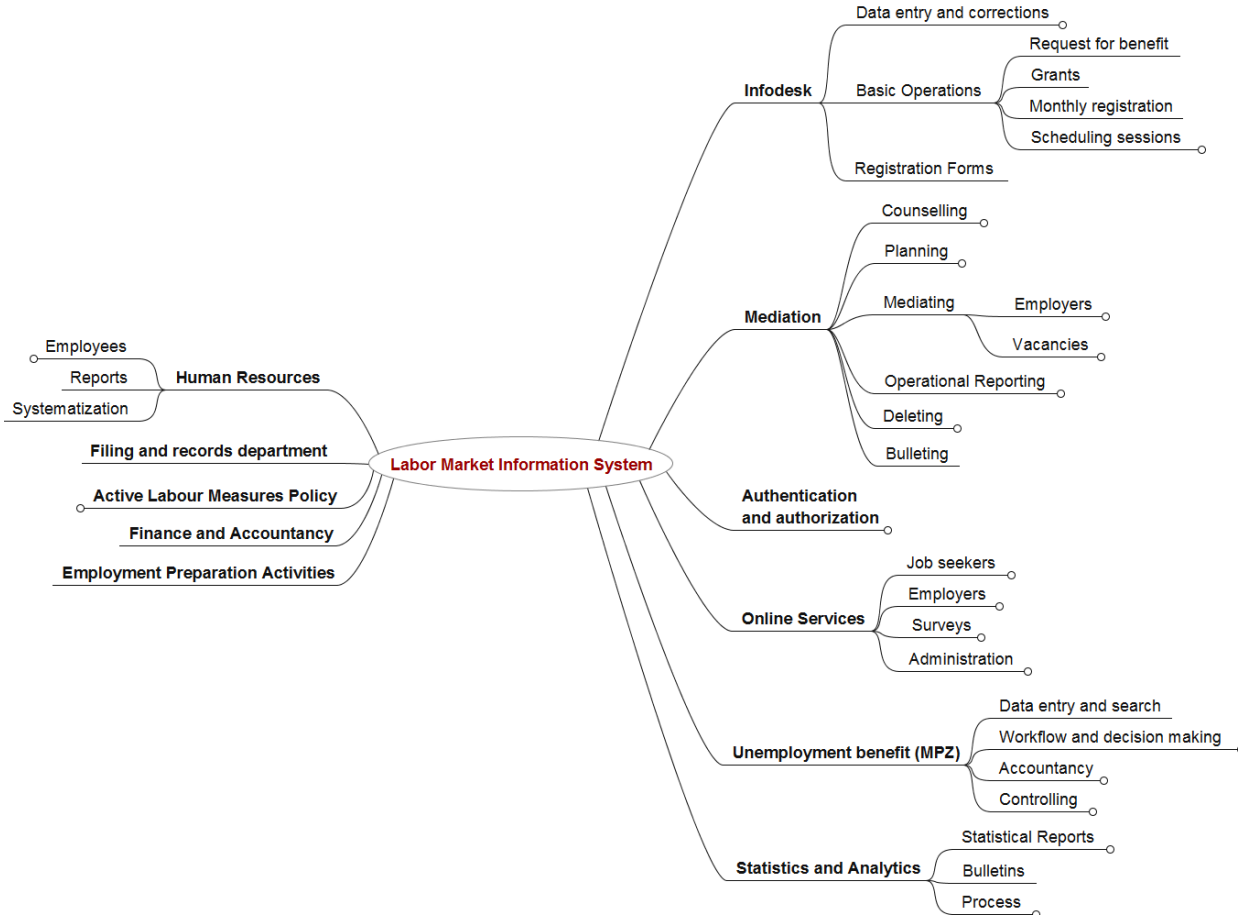


Figure: Structural overview of LMIS System

Unemployed and Job Seeker's Registry module

This is core module, which provides functionalities aimed at most important EAM customers – unemployed persons and job seekers. It should designed with info-desk front end capabilities in mind, providing a one-stop-shop environment suited for fast registration of unemployed persons and job seekers with detailed data entry and validation, issuance of EAM application documents and forms, handling requests for benefits, regulating grants, monthly registrations and scheduling of sessions. Registration process should include verification and/or entry of the correct client's residence address and other contact information. This information should be used to determine which District Office has authority and jurisdiction regarding registered clients since EAM operates in all Montenegro's counties, districts and cities, and therefore, the accuracy of information is of great importance considering both operational and legal aspects.

This module should provide functionalities aimed at handling of the following data sets:

- General information
    - First name,
    - Last name,
    - Date of Birth,
    - Place of Birth,
    - Nationality,
    - Personal Identification Number,
    - Gender,

    - Place of residence - Address, City,
    - Contact Info
    - Etc.
- Formal Education
- Informal Education
- Skills and Qualifications
- Working Experience (insight into e-Workbook)
- Personal Employment Plan
    - a detailed plan and agreement between EAM and unemployed persons regarding their approach to all activities that could bring to successful employment)
- Categorization (internal segmentation of registered unemployed persons and job-seekers)
- Ability to build profile and assess motivation
- Professional orientation
- Special statuses
    - disabilities,
    - marital status,
    - Children etc.
- CV
- Career guidance professional counseling records
- Log of all activities (Gathering data for performance management)
- Banking Accounts for payment of benefits
- and other information

Core operations provided in the module should be:

- Search (advanced search with relevant parameters)
- Data-entry and data-validation (integration with government institution (MUP) for personal information validation)
- Registration and regulation of status (record creation and management, check-in, check-out)
- Issuing certificates and documents (integration with Document Management System and Filing and Records Applications)
- Scheduling appointments (interviews, workshops etc.)
- Career guidance and professional orientation and counseling
- Regular monthly reporting
- Activity tracking
- Integration / Connection with other respective modules (such as benefits, ALMP, Mediation and others)
- Reporting
- and other operations

Employers Registry module

Employer Registry is a central registry of employers, integrated through interoperability modules with relevant institutions that provide vital information about potential employers on Montenegro's labor market such as Central Registry of Commercial Entities and Statistical Office of Montenegro. This module provides means of employer registration (record management), advanced search with various criteria, contact management and integration with other modules such as ALMP, vacancies and mediation.
This module should provide functionalities aimed at handling of the following data sets:

- General information
- Contact information
- Statuses (active, passive)
- Activities
- Vacancies
- Fluctuations of employed and other statistics required for segmentation of employers
- Banking Accounts (for payment of ALMP subsidies)
- and other information

Core operations provided in the module should be:

- Search (advanced search with relevant parameters)
- Data-entry and data-validation (integration with government institution (MUP) for information validation)
- Registration and regulation of status (record creation and management)
- Scheduling appointments (interviews, workshops etc.)
- Activity tracking
- Integration / Connection with other respective modules (such as Vacancies, ALMP, Mediation and others)
- Log of all activities (Gathering data for performance management)
- Reporting
- and other operations

Job Vacancy Registry module

Job Vacancy Registry module is aimed at registration and processing of employer vacancies. It allows for detailed entry of all parameters and requirements regarding an open position for future employment. Employers could provide their Vacancies through various channels including on paper, fax, by phone but preferably, it should be delivered digitally via Internet web-portal. Once received, EAM counselors should process the vacancy through cooperation with the employer and the publish it on the web-portal and on the billboards in EAM premises.

This module should provide functionalities aimed at handling of the following data sets:

- General Vacancy information (number of required candidates)
- Contact information (where to send CV or attend interviews)
- General Requirements and Criteria (for the candidates)
- Conditions of Employment
- and other relevant information

Core operations provided in the module should be:

- Search (advanced search with relevant parameters)
- Data-entry and data-validation
- Registration and regulation of status (record creation and management)
- Integration / Connection with other respective modules (such as ALMP, Mediation and others)
- Log of all activities (Gathering data for performance management)
- Reporting
- and other operations

Mediation module

Mediation module is suited for management, handling and finding appropriate job candidates based on open vacancies guided by the process of job-matching, candidacy, including the preparation for job interviews and placing of CV's through workshops and other follow-up activities accompanied with operational reporting as well. This module integrates Unemployed and Job-Seekers Registry module with Vacancy Registry module, connecting the demand and the supply in the labor market.

This module should provide functionalities aimed at handling of the following operations:

- Job-matching module (advanced search of candidates and vacancies)
- Candidacy lists management
- Job Interview Management (with ability to capture feedback provided by employers)
- Time Schedule for organizing Workshops
- Integration / Connection with other respective modules (such as ALMP, Mediation and others)
- Log of all activities (Gathering data for performance management)
- Reporting
- and other operations

Unemployed Benefits module

Unemployed Benefits Module is a specialized module for registration, verification and establishment of the status of unemployed persons and managing their records regarding the benefits providing data administration, workflow and decision making, accountancy, controlling, reporting and integrated documents management. Benefits management is parametrized, harmonized with current legislations, and allows for high-volume data processing for monthly calculations and payments.

This module should provide functionalities aimed at handling of the following operations:

- Search (advanced search with relevant parameters)
- Data-entry and data-validation (including all the parameters necessary for the calculation of the benefits)
- Placement of requests for benefits
- Processing of requests and decision making (acceptance or rejection)
- Integration with Filing and Records Management (and Document Management Sub-system)
- Integration with Financials (processing payment requests)
- Integration / Connection with other respective modules
- Log of all activities (Gathering data for performance management)
- Reporting
- and other operations

Active Labor Measures Policies (ALMP) module

ALMP module allows for thorough administration of requests, contracts, registrations, fulfillment of contractual obligations provided by ALMP measures. It could be achieved by collecting required information, registering beneficiaries and employers (and other contracted parties, based on the types of measures), handling and managing documents (requests, approvals, contracts) through established workflows, allowing for fund reservations and calculations, preparation of payment orders according to business rules arising from particular measures. The whole history of all

participants, contracts and transactions should be preserved within this module, allowing for future planning.

This module should provide functionalities aimed at handling of the following operations:

- Search (advanced search with relevant parameters)
- Data-entry and data-validation
- Placement of requests for ALMP measures (by employers)
- Processing of requests and decision making (acceptance or rejection)
- Project Management for particular ALMP projects (time table, resources, goals)
- Financial planning and reservation of funds for projects
- Gathering data for performance management
- Preparation of Payment Requests
- Integration with Filing and Records Management (and Document Management Sub-system)
- Integration with Financials (processing payment requests)
- Integration / Connection with other respective modules
- Reporting
- and other operations

Planning and Time Management module

This helping module should be central tool for time management and planning of various activities through calendars, coordinating activities of all participants of LMIS including counselors, employers, unemployed persons, job seekers and others. Ticketing systems should be implemented so that info-desk operators could very efficiently and quickly schedule appointments and other sessions. This module should be very well integrated with all other modules.

Administration module

User Authentication should be based on Directory Services (LDAP) while Authorization is managed through centralized Administration Module providing identity and role based security management with Single Sign On mechanism for all application modules. Weather users access the applications from the central office or branch offices, authentication and authorization should be centralized for all modules. This module should allow for pairing of application modules, forms, reports and related functionalities with respectable users roles and their rights. Administration module should be also centralized solution for the management of all codebooks such as:

- Organization Structure and Departments
- Positions
- Departments
- States
- Regions
- Places (and cities)
- Information on citizenship and nationality
- Data on schools, academic backgrounds, professions
- Foreign languages
- Types of Employment
- Education level
- Activities (and classes of activities) of Employers
- Activities of Unemployed

- Occupations (ISCO)
- Groups of interest
- Types of Disabilities
- Social categories
- Basis of insurance
- Marital statuses
- Requirements for the willingness of accepting the offered job
- Qualifications
- The catalog work competencies
- and other codebooks

Reporting, Statistics and Analytics modules

EAM LMIS should be also equipped with extensive reporting capabilities including operational reports meant to be used on daily basis for ongoing activities and measuring performance, ability to perform ad-hoc reporting. All reports should be parametrized and provide means of filtering and sorting the data according to back-office needs. Reports should be exportable to Excel and PDF formats for easier dissemination. Scheduling and automation of report creation is also important feature of reporting module. Microsoft SQL Server Reporting Service (SSRS) is excellent platform for implementing and scheduling generation of reports.

Statistical reporting should be provided with advanced analytical tools aimed at data analysis, support for decision making, planning and examining trends in the labor market. Through methods of Extract, Transform and Load (ETL), as a vital part of analytical sub-system, data should be stored in data-warehouse and processed to data-cubes for advanced analysis and Business Intelligence (BI) Reporting with tools such as Power BI, Power Pivot and other BI tools.

Examples of various reports:

- Total number of unemployed persons
- Total number of Newly registered
- Total number of employees
- Total number of Persons seeking employment
- Total number of Persons deleted from the register
- Total number of the unemployed who are seeking employment for the first time
- Total number of Persons with disabilities
- Total number of Users of health care
- Total number of Vacancies
- Total number of Unemployed Professionals
- Total number of Number of Unqualified Persons
- Total number of Employed foreigners
- Reports regarding the Unemployment Benefits
- Reports regarding the Active Labor Market Policies
- And many other reports

Example of data-dimensions for the BI analysis and reporting:

- Date & Time,
- Occupations,
- Vocations,
- Education,

- Qualification (unskilled, semi-skilled, skilled, highly skilled, college and university degree)
- Activities (businesses),
- Organizational structure,
- Age,
- Gender,
- Disabilities,
- Duration of unemployment,
- Employment,
- and other data-dimensions

Web Portals

EAM LMIS should also implement internet modules in form of public facing web-portals:

- **Public web-portal (Berza rada)** which provides online services for:
  - Job seekers
    - registration,
    - advanced search for job vacancies,
    - creation of user profile
    - CV placement (in accordance with EuroPass CV format),
    - insight into customer information managed by EAM and consent management (GDPR readiness)
    - ability to communicate with advisors and counselors via messaging system (chat / inbox feature)
  - Employers
    - registration,
    - advanced search for employees based on keywords (CV) and other characteristics,
    - online surveys,
    - placement of job vacancies,
    - ability to communicate with advisors and counselors via messaging system (chat / inbox feature)
  - Account Administration
  - Exchange of information with 3rd Parties
  - Ability/functionality to receive information regarding Job Vacancies and Job Seekers Profiles from 3rd party agencies in order to align with EURES requirements
  - and more operations

- **Online Statistical web-portal** implemented as a self-service BI portal offering analytical capabilities and creation of custom reports based on the publicly available database containing various data dimensions with most important statistical data related to the current Montenegro's labor market indicators

Both web-portals should be implemented as extensions to existing on-premises LMIS but oriented towards internet customers. Both systems should be tightly integrated with the back-end system and secured with security standards such as OWASP.

EAM web portal should be a central web-portal targeted at job seekers, unemployed persons and students (as the future most vital work force) with the aim of uniting all the diverse and scattered information regarding employment possibilities, job opportunities, life-long career guidance, counseling and vocational trainings in order to consolidate and further revive the Montenegro's Labor Market.

The goal of this project is to shorten the time required to find appropriate job opportunity or vocational training leading to successful employment by providing all the necessary information at one coherent source, connecting many participants and giving them ability to take most of the actions directly online.

Targeted user groups of the portal are divided in three main roles:

1. Job seekers (unemployed persons, job seekers and students)
2. Employment agencies and recruitment offices (both public and private ones)
3. Vocational training centers (this is optional, to be further discussed)

Registered portal users, depending on their role, will have different rights and options at hand. Each user will have dedicated and verified account providing their personal online profile and access to certain functionalities of the portal.

Job seekers will have options to publish their profiles describing their work experience, education (both formal and informal), skills (soft and hard), special competencies, knowledge of languages and IT tech, providing links to their online resumes and portfolios (such as LinkedIn) building a searchable database suitable for job matching with the job offers and career advancements through professional trainings. Their CVs could be also downloaded and shared in standard Euro-Pass format. Job seekers will have the ability to define their intended employment and education preferences in terms of keywords, occupation, regions and other criteria with the ability to subscribe to newsletters in order to be alerted when an opportunity arose.

Employment Agencies and Recruitment offices will have options to post job vacancies with all the necessary details such as number of required candidates, contact information, general requirements and criteria for the candidates (i.e. required skills and education, experience), conditions of employment and other information. New vacancies would be placed on daily basis. Job seekers would have search engine suitable for querying vacancies based on their preferences via the matching-matrix. Employers would not have direct access to the portal, but employment agencies and recruitment offices would handle all their request, providing mediation, job matching, head-hunting and other engagements in order to find appropriate candidates. Vacancies should be ranked and prioritized in order to allow some more exciting job opportunities to stand out of the crowd (i.e. hot-jobs) and since labor market has also competitive character, advertising revenue should be considered.

Vocational training centers will have ability to publish their professional training courses and educational programs with detailed descriptions, titles, targeted population, length, schedules and curriculums, providing essential information regarding future job opportunities for candidates who undergo their educational programs and trainings. They will prepare and publish their programs and information on annual basis. Portal will allow job seekers to register for trainings, connecting them directly with agencies and training centers.

Portal will also provide **general information** regarding the labor market, legislation, education, trainings and employment in form of news articles, blog posts, documents and frequently asked question (FAQ) section. It will allow users to post their questions via contact forms and participate in

open discussions, providing their feedback or even share content on popular social networks such as Facebook or Twitter. Therefore, **portal administration** will cover content management functions, user administration, moderation and monitoring of user interaction of data-integration. Portal will also gather logs based on the user participation in searches postings and requests, making a fertile ground for various usage statistics and analysis, displayed on administration dashboards and reports.

All the **information should be spatially organized** depending on the certain **region** and **city** and integrated with geographical maps for better visualization. Portal will support **multi-language content** and international user profiles so that it could secure resources for future expansion with potentiality of covering the whole Balkans region. The future of the portal could also envisaged with connection to EURES and other recruitment market groups such as Alma Career.

Important role of the portal would be also to provide **unifying integration platform** with clear and strict **standards regarding information structure** (i.e. data fields in vacancies, CVs or educational programs) backed up with documented interfaces which would be designed for all parties (e.g. agencies) to use in order to enter their data into the system in a structured and controllable way. Portal engine will then process and validate the data for errors and import it into central database once established criteria has been met. Standards for master data management (i.e. using only standardized codebooks such as ISCO), data-matching algorithms, data-entry and data-exchange should be established in form of documented interoperability framework with clear instructions for all partners and agencies.

Filing and Records Department module

Records Management application is a specialized back-office solution (module) used for electronic filing and records management. Application should provide support for maintenance of all the records in all the offices, outlining the organization's activities and circulation of documentation from the time they are created up to archiving. Software should also provide operations such as admission, classifying, identifying (searching), storing, securing, tracking the circulation of documentation for authorized movement of the records, shipping and archival preservation. Records have to be organized in cases and dossiers and could be easily identified. Software is compliant with current legislations. This module should be integrated with LMIS core modules for the purpose of recording of issued documents and assigning classification and protocol numbers automatically. The module should be also integrated with Document Management subsystem for the purpose of storing and fetching digitized documents such as contracts, decisions, requests, registration forms and other documents.

Human Resources module

This is a specialized back-office module for EAM employee record management including their position in the organizational hierarchy, competencies, workplace specific obligations and other professional information. It is integrated with the Administration module by relating roles and authorization rules with particular users throughout the LMIS system.

Financials and Accounting module

The main purpose of this specialized back-office module is to record and process daily transactions such as funds paid or received. The financial accounting application is composed of various modules, different sections dealing with particular areas of accounting. The central module is the general ledger - the main accounting record. It includes accounts for items such as current assets, fixed assets, liabilities, revenue and expense items, gains and losses. Accounting summarizes and submits information in reports and statements. The reports are intended both for the EAM itself and for

outside parties such as tax authorities. At any given moment it is possible to attain a balance sheet which summarizes assets, equity and liabilities at a specific point in time. An annual report is generated at the end of the financial year and gives comprehensive report financial activities throughout the preceding year. Financials module should be integrated with LMIS core modules for handling of benefits and Active Labor Market Policies in terms of accepting and processing payment orders and updating payment statuses.

Data Integration and Interoperability modules

Data Integration and Interoperability modules should be implemented based on Software Oriented Architecture (SOA) principles in form of Web-services hub. The purpose of these modules is to integrate Core LMIS with its surrounding components in efficient and error prone manner.

Document Management Subsystem

Document Management Subsystem (DMS) should allow for storage and retrieval of digitized documents such as request, contracts and all other forms. Document
The main purpose of the Financial accounting application is to record and process daily transactions

Performance Management Subsystem

The main purpose of the Performance Management subsystem is to provide means of tracking efficiency of end users (namely advisors, counselors and other users). Efficiency would be measured and represented in the form of Key Performance Indicators (KPI's) and later reported to the management. The aim of this system is to detect and eliminate bottlenecks in the system, and to achieve performance gains where possible.

Interoperability with other systems and Institutions

Interoperability and integration modules are a vital part of the LMIS system providing ability to exchange data with various institutions in the field of labor market and legislation including. Web-services hub for Data Integration and Interoperability should be based on Software Oriented Architecture (SOA) principles in order to integrate LMIS with central government portal and other services including:

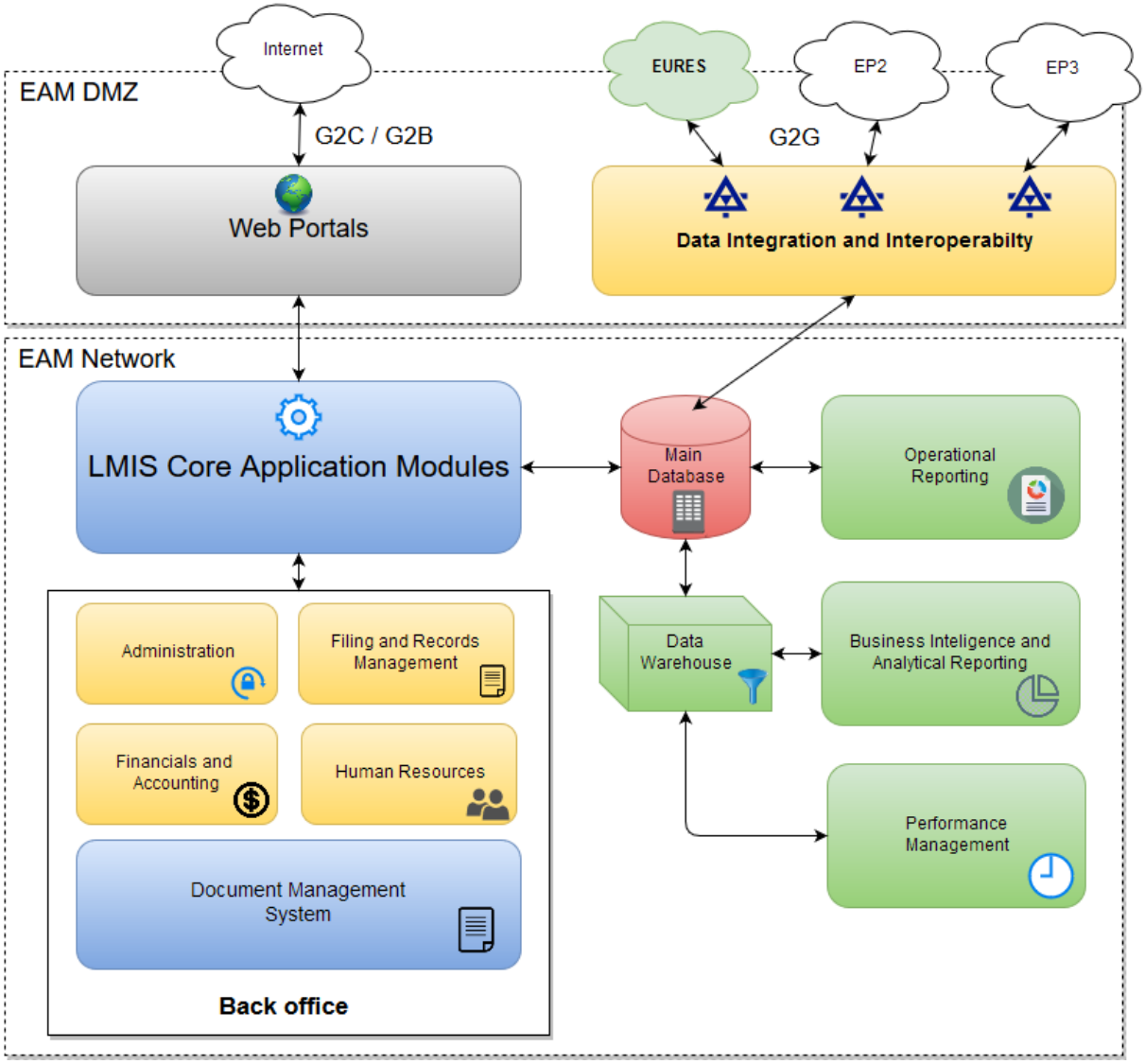
- eGovernment Portal of Montenegro – Portal eUprave Crne Gore
- Fund for Pension and Disability Insurance – Fond penzijskog i invalidskog osiguranja
- Central Registry of Commercial Entities – Centralni registar privrednih subjekata
- Statistical Office of Montenegro – Zavod za statistiku Crne Gore (MONSTAT)
- Ministry of Finance – Ministarstvo finansija
- EURES - European Employment Service
- Government Identification and Authentication system with Personal Inbox (once available),
- e-Workbook system (once available)
- And other services / relevant institutions.

There is also need for internal integrations of LMIS Core components with other back-office sub-systems in EAM such as financial department (for exchange of data regarding payment orders), filing and records department, centralized administration, human resources.

Logical structure of LMIS system

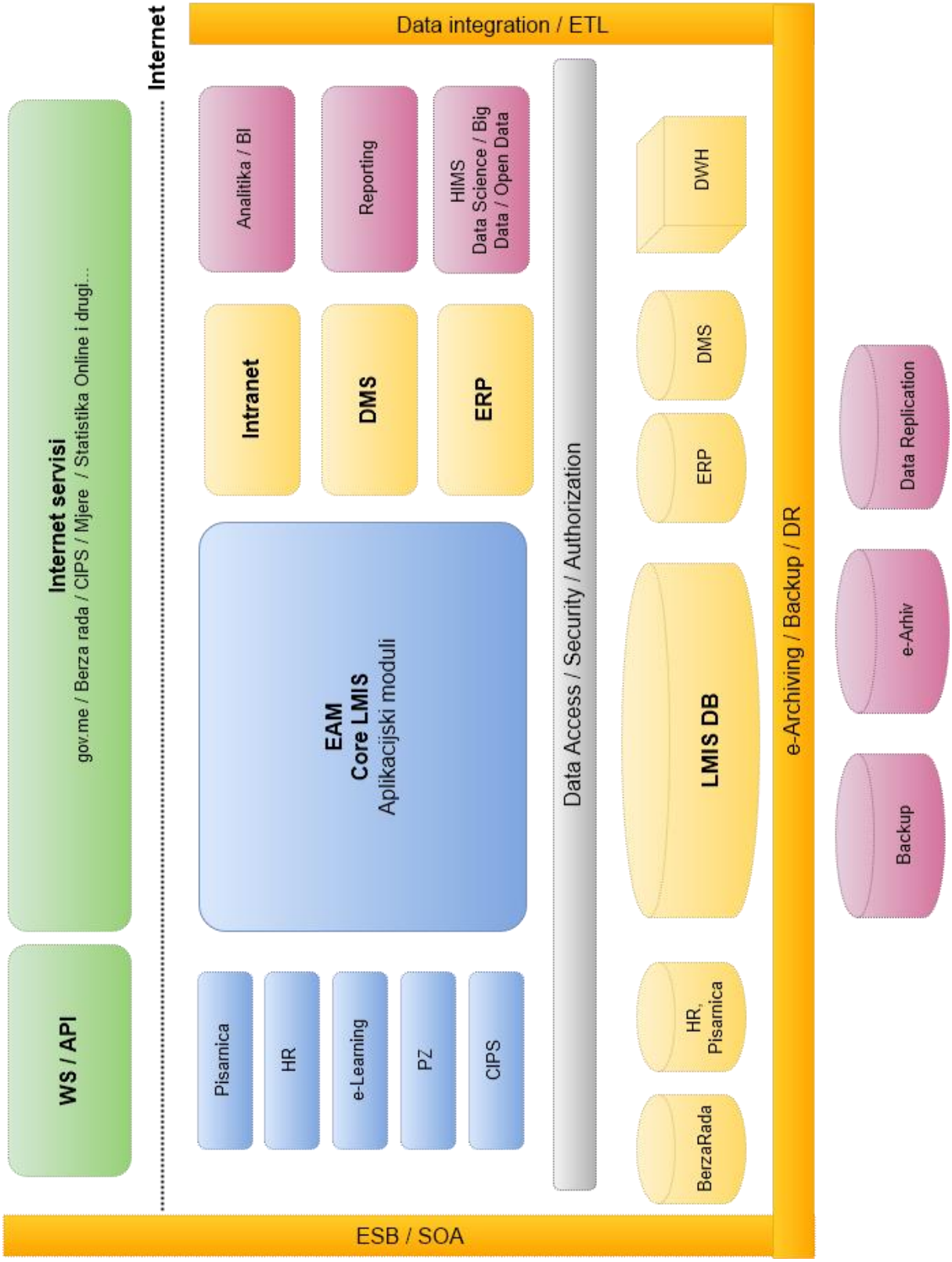
This figure represents high-level structural and logical overview of the LMIS system. Essential parts that are currently missing in existing system are:

- DMZ with web portals and gateway with interoperability access for Data Integration and Interoperability
- Data Warehouse with BI analytical toolset
- Performance management
- Back office empowered with Records management and DMS



Extended overview of LMIS building blocks

This figure is an additional and extended logical overview of possible building blocks of the future EAM LMIS system. Not all of the elements/blocks are necessary, but some of their functionalities or substitutes with similar functionalities has to be the part of the system.



Technical Requirements

Infrastructure

- EAM Information System includes several locations which are connected to the Central Office since all the applications should be centralized.
- System should be entirely based on Web Technology Stack and realized as intranet web-technology based solution.
- All application modules should be developed using modern n-tier Application Framework running on a web-server(s).
- The system should be designed as scalable Online Transaction Processing (OLTP) system working in High Availability mode, compliant with EAM Security Policies and procedures. It is highly recommendable to ensure high-availability based on Network Load Balancing technology for application servers and Failover-Clustering for database servers
- Database system should consist of a failover-cluster (active-active) running an industry standard SQL based RDMBS (such as Microsoft SQL Server)
- A separate server(s) for Data-warehouse with Analytical Services for Business Intelligence purposes (e.g. Micrososft SQL Server Analysis Services and SQL Server Integration Services)
- All EAM locations should be linked into a single Wide Area Network using appropriate network topology.
- EAM information System should be protected with Enterprise Anti-Malware solution for anti-virus and anti-malware protection.
- For backup purposes, system should rely on Enterprise Scale Backup Software with automated tape library or similar permanent storage technology.

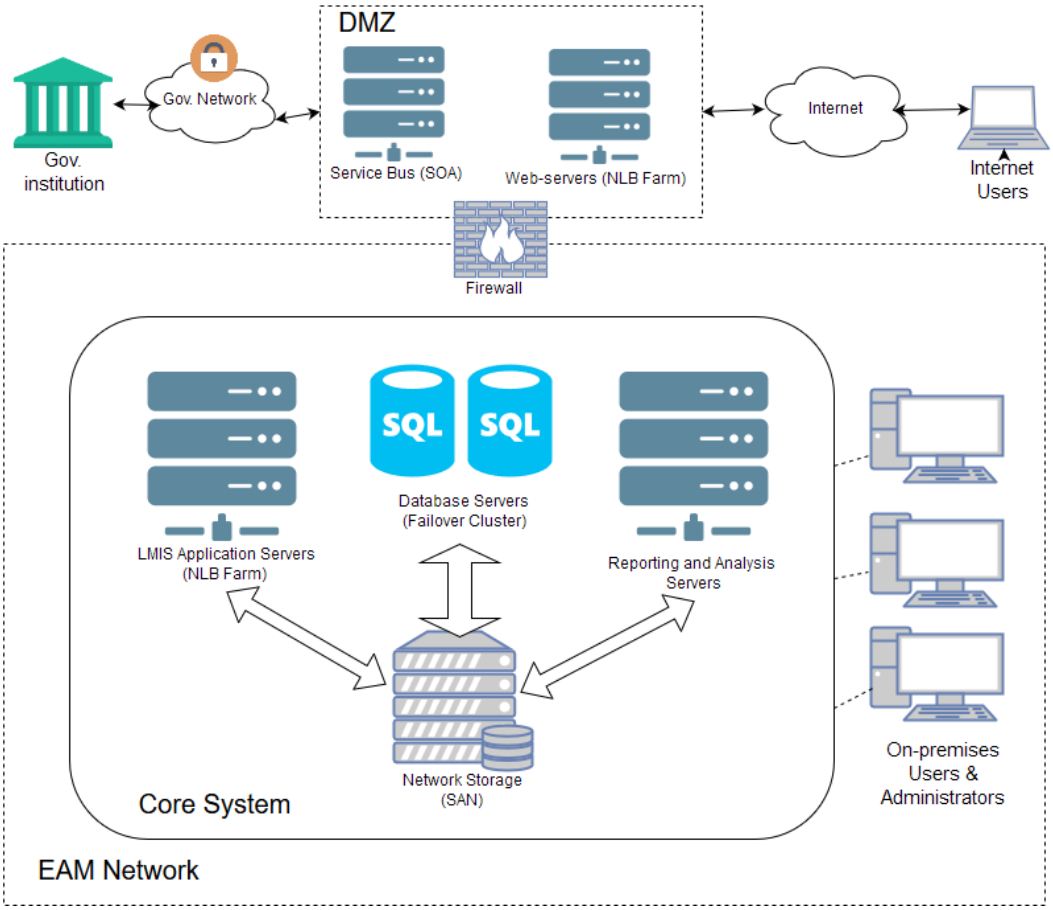


Figure: Simplified physical structure of LMIS System

- Use of **Virtualization technology** (e.g. Microsoft Hyper-V, WmWare etc.) would be highly recommendable in order to have maximal flexibility in provisioning and server management and optimization of server licensing (i.e. when licensing Hyper-V host server with Windows Server Datacenter License, you can create unlimited number of Window Server machines on that host (limited with physical resources such as CPU cores, Disk and available RAM)
- Although, specification of hardware is subject to change, here are couple of suggestions:

Setup #1

- **Server**/Host machine**:**
  - HP DL380 Gen9, Intel Xeon E5-2620v4 8-Core 2.10GHz 20MB (x2), 16GB (1x16GB) 2400MHz RDIMM, 0x HDD do 8x Hot Plug 2.5", P440ar/2G SAS, No Optical, 4x 1Gb LAN, 1x 500W Plat, 2U, CMA
  - RAM**:** HPE 32GB 2Rx4 PC4-2400T-R Kit x 4 (or more) = 128 Gb
  - Power Supply: HPE 500W FS Plat Ht Plg Pwr Supply Kit
  - Intern disk: HPE 300GB SAS 10k SFF SC HDD (for Host OS) x1
  - Host bus Adapter: HP H241 Smart HBA
  - HP Integrated Lights Out (ILO)
- **SAN Storage:**
  - HP MSA 2040 Energy Star SAS Dual Controller SFF Storage
  - Disks**:** HPE MSA 1.2TB 12G SAS 10K 2.5in ENT HDD (x 4) = 4.8 Tb
  - Cables**:** HP Ext 2.0m MiniSAS HD to MiniSAS HD Cbl
- **Enclosure** + cables
- **UPS**
- **Software**:
  - Windows Server Datacenter 2016 64-Bit 16 cores (or less)
  - Microsoft SQL Server 2016 Standard 16 cores (or less)
- **Client computers**:
  - HP All-in-One 20-c210
  - Windows 10 Home 64
  - Intel® Celeron® processor
  - 4 GB memory 1 TB HDD storage
  - Intel® HD Graphics 500
  - 19.5" diagonal HD+ display

Setup #2

- **Server:**
  - Rack mountable
  - CPU: 1 (single) 64 bit processor, 4 Cores; 15 MB, Level 3 Cache; 3GHz clock speed
  - Memory: 64 GB
  - Graphics: integrated graphics controller
- **Storage Area Network - SAN**
  - Hard drive array
  - Type: iSCSI
  - Form factor: rack mountable, plug-in card
  - Supported Drives: SAS/SATA3

- Capacity: 4.5 TB
- Hard disk drives: 15 x SAS hot pluggable disk drives with 300 GB capacity at 15K rpm
- RAID level: 0, 1, 5, 6, 10
- Network: 2 (two) Gigabit Ethernet Ports
- Host Connectivity: 2 hosts directly connected or 16 servers when configured with an Ethernet switch
- Storage Controller: Redundant
- Power Supply: Redundant
- System Management: support for hardware
- management and control
- Remote Management: 1xRJ45 10/100MB Ethernet

- **Software**:
  - OS: 1xMS Windows Server Standard 2016 x64 (Single Quad Cores Processor License)
  - RDMBS: 1xMS SQL Server 2016 Standard Edition x64 (2xStandard 2-pack of Core License)
- **UPS:**
  - Technology: Smart UPS
  - Form factor: rack mountable
  - Power output: 3000 VA
  - Output wave: Sine Wave
  - Backup time: 4 minutes at 100% load, 15 minutes at 50% load
- **Clients computers:**
  - Form factor: Small Form Factor (SFF)
  - CPU: 64 bit; dual core
  - Memory: 4 GB
  - Graphics: integrated graphics controller
  - Hard Disk Drive: SATA 500 GB
  - Optical Drive: Multi DVD Write/Read
  - Audio: integrated
  - Network: integrated network card
  - Monitor: LCD/LED integrated, 20' or bigger
  - Keyboard and Mouse: USB, Montenegrin keyboard layout
  - OEM Windows 10 Professional

Security

Access to the information system should be regulated based on the user profile and their respective rights. Security checks should be done in two standard steps as follows:

- Authentication - identification of user identity based on the directory (LDAP)
- Authorization - identification of rights for authenticated users based on the roles

User profiles should, however, be a part of a wider context – domain's directory service (LDAP). Once the user is successfully authenticated, the Administration module should evaluate the user's rights with regard to assigned roles (such as "adviser", "info desk", "administrator" and other respectable roles) and accordingly make options and items in applicative support available. Activities performed by the users should be recorded in the application journal for the purpose of forensics. Transportation data through the network infrastructure EAM should be realized by using an encryption protected communication protocol HTTPS (HTTP over SSL).

General requirements for client software

- There should be no complex installation procedures on the client side.
- New versions and upgrades should be installed on the central location and all users should automatically get the latest version.
- Application demands towards client resources (CPU, RAM, disk space) should be minute.
- Administration procedures on the client side should be set to minimum - need only a web browser

Graphical User Interface

Graphical User Interface (GUI) should be realized as a modern web interface suited for simultaneous operation of concurrent users, taking into account the relevant standards and practices in the software industry. Operating environment for the application should be standard web browser (e.g. Google Chrome, Mozilla Firefox or Microsoft Internet Explorer), which offers numerous advantages including the possibility of opening unlimited number of screens displaying various screen forms and reports. Each application module should be equipped with a standard set of screen form elements providing the integrity and uniform mode of operation:

- **Main menu** provides access to each software module through unique navigation system, which should be an integral part of every form. Visible menu items in the menu should be determined based on user's roles and associated rights
- **Search bar** allowing for searching of records within the particular module based on a combination of criteria (filters) that will allocate those records meeting proposed criteria.
- **Master form** provides means for working with data relating to the observed entity (such as an unemployed person, employer, workplace, etc.). The form will allow for a review and update of all relevant data of the observed entities, as well as the ability to delete it if the business rules permit such actions.
- **Detail form** allows manipulation of data subsets related to the main record (represented as an entity on the main form)
- **Reports** - a group of different parameterized reports relating to the particular entity and its related business processes. Aim of reports is to monitor quantitative changes in business processes, statistical characteristics of business information, the efficiency of advisors work (performance management)
- **E-forms** are designed to enable printing of electronic versions of official documents and forms used in formal correspondence in a standard printer friendly format

Here are few example screenshots of existing LMIS applications that should be considered during design of EAM LMIS user interface:

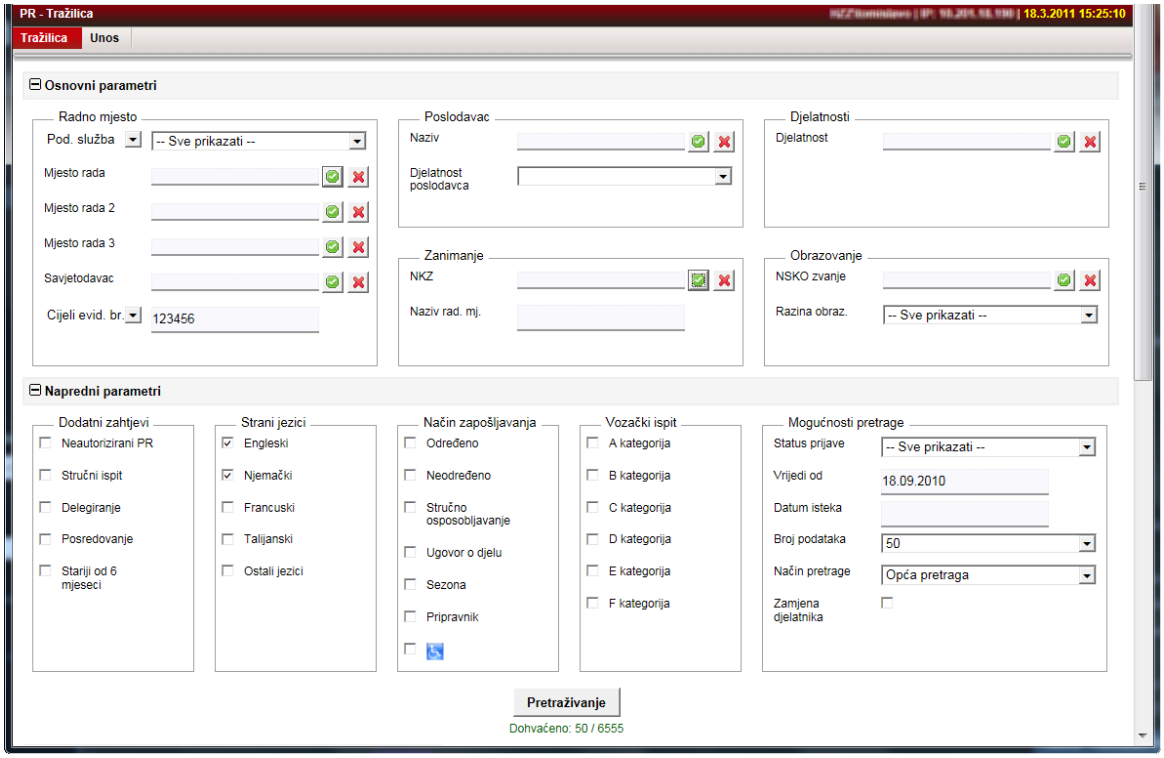


Figure: Possible design of a search form

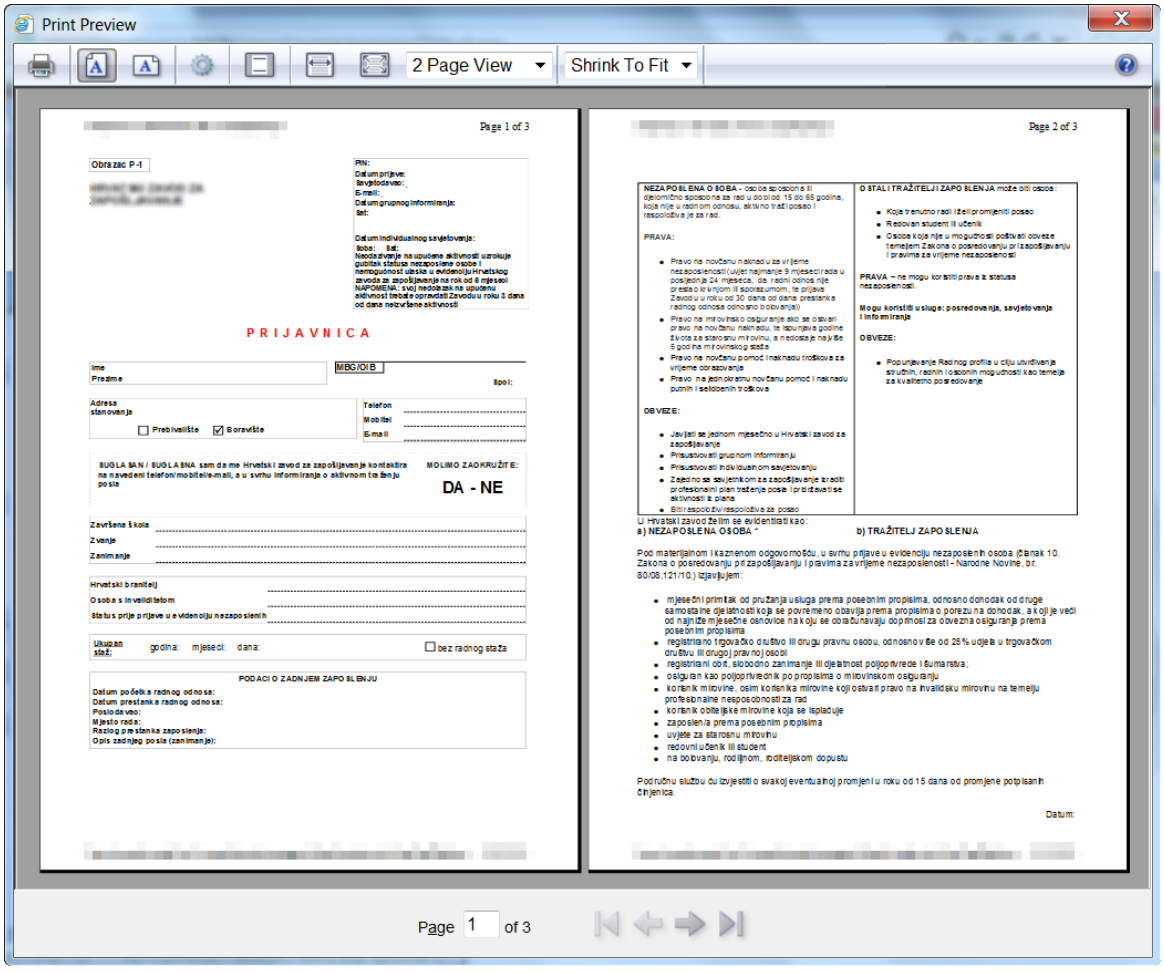


Figure: Electronic Document for Printing

Recommended Development Framework and Architecture

Considering that current LMIS is implemented on Microsoft Technology Stack, and that the cost of data migration is considerable in context of any project, recommendation is to strongly consider development of the future system on Microsoft stack or at least to use Microsoft SQL Server as RDBMS for following reasons:

- RDBMS based on Microsoft SQL Server is already in a good shape and up to date
- Lot of the business logic and reporting functionalities is already stored in the database and technologically ready to use (improve and refactor)
- IT staff is already acquainted with Microsoft Stack
- It is relatively easy to find/get vendors who develop on Microsoft stack since it has rather large community and it's easier to get maintenance and long term support

These are proposed guidelines for the development and technical implementation of the future system. Final selection of technology, software support and architecture should be made in cooperation with the Beneficiary based on the budget and other procurement parameters.

Proposed Guidelines:

- Platform: Web Application based on ASP.NET platform
- The system should be developed using .NET Framework 4.x or newer;
- Relational Database Management system should be Microsoft SQL Server,
- Host operating system: Microsoft Windows Server 64bit
- Web Server: IIS 7 or later
- Development Environment : Visual Studio 2017
- User Interface:
  - Bootstrap CSS or other framework suited for responsive design interfaces
- Programming Languages:
  - Backend: Visual C#
  - Front-end: JavaScript (or TypeScript)

Overall System Architecture

In its most abstract level, the architecture for the LMIS will follow the standard multi-tier distributed model conceptually shown on the following picture. The system should be centralized with centralized data center, database and administration.

Figure: High-level Architecture

Respecting this three-tier architecture, the topological sketch of the future system is shown in the following figure:

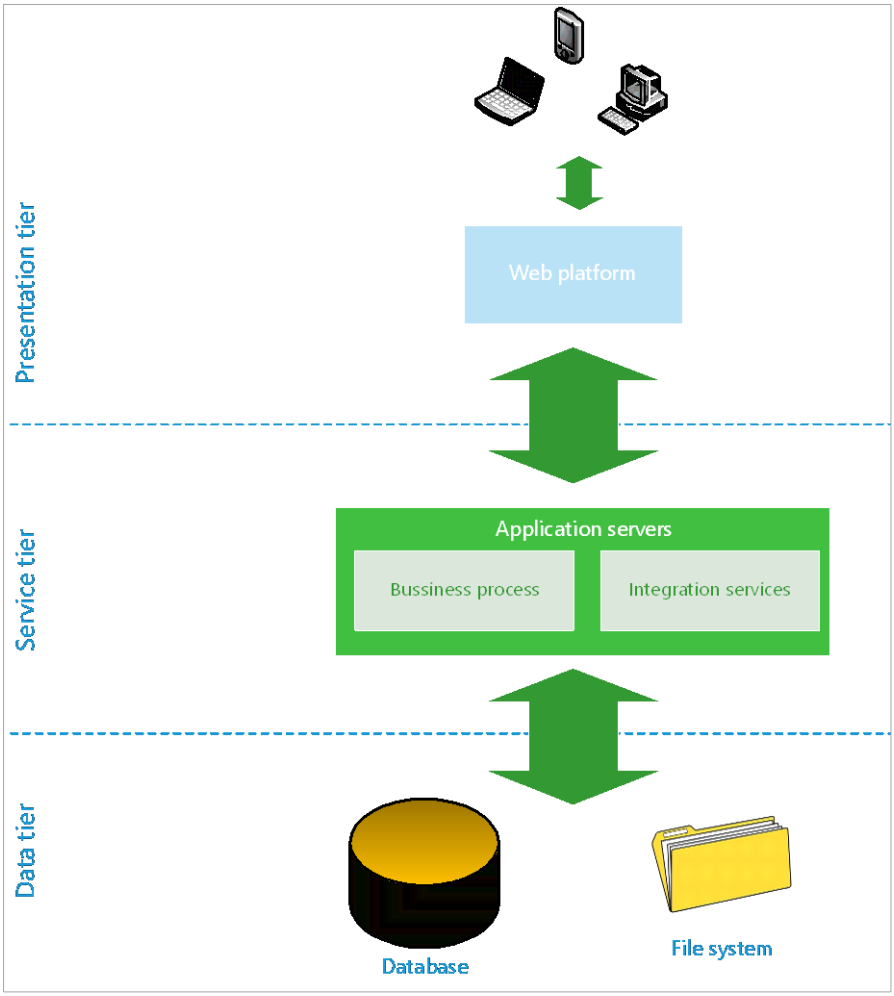


Figure. Three tier Architecture

MVC Design Pattern

- The system will use the **Model-View-Controller (MVC)** design pattern form of software architecture. This form is used in software engineering to separate individual application parts into components depending on their purpose (separation of concerns).
- The model consists of data, business rules, logic, and functions embedded in business logic.
- **View** is any display of data such as a form, table or diagram. It is possible to view data through multiple views. The **controller** accepts the inputs and converts them into orders in the **model** or **view**.
- Such an architecture facilitates the independent development, testing and maintenance of a particular application.
- MVC design should be used with ASP.NET platform.

Service Oriented Architecture

In addition to tracking the basic three-tier architecture, which in itself allows for significant scalability and robustness, system should also implement the principles of Service Oriented Architecture (SOA). SOA implies a set of rules that are used when designing and deploying the system. Systems based on SOA principles encapsulate a set of functionalities within interoperable services that can be used through standard interfaces and protocols from a variety of systems that cover even a very diverse

business area. Our system will apply SOA principles when building a service layer to facilitate easier interoperability with other, internal or external systems. Furthermore, part of the services realized will enable the disclosure of the functionality of our system to the outside world.
SOA defines the interface (data model data), the protocol (the way the message is transmitted), and functionality. One of the most common forms of service is web services - the services whose messages are formatted as XML messages that are transmitted by the standard HTTP web protocol. SOA principles are most commonly used in the middle, service layer that implements functionalities related to business process processes.

Data Tier

Data tier should be based on the Microsoft SQL Server. Main features of the Microsoft SQL Server database should be used in compliance with business requirements of the future LMIS System.

Service Application Tiers

The service tier consists of a series of sub-layers that are sequentially organized, each containing a portion of the implementation:

- **Client Services** - serve to communicate with presentation tier (all kinds of clients). It contains web services, security checks, logging and journaling
- **Business Logic** - Implements a specific application logic that is responsible for certain processes
- **Extended data services** - takes care of Logging and Journaling monitoring tasks. Communication with external systems is also realized on this subfloor
- **Basic data services** - data layer communication

Layers could be implemented on one or more application servers, enabling the system to be scalable. The choice of the application server itself depends on the technology used.

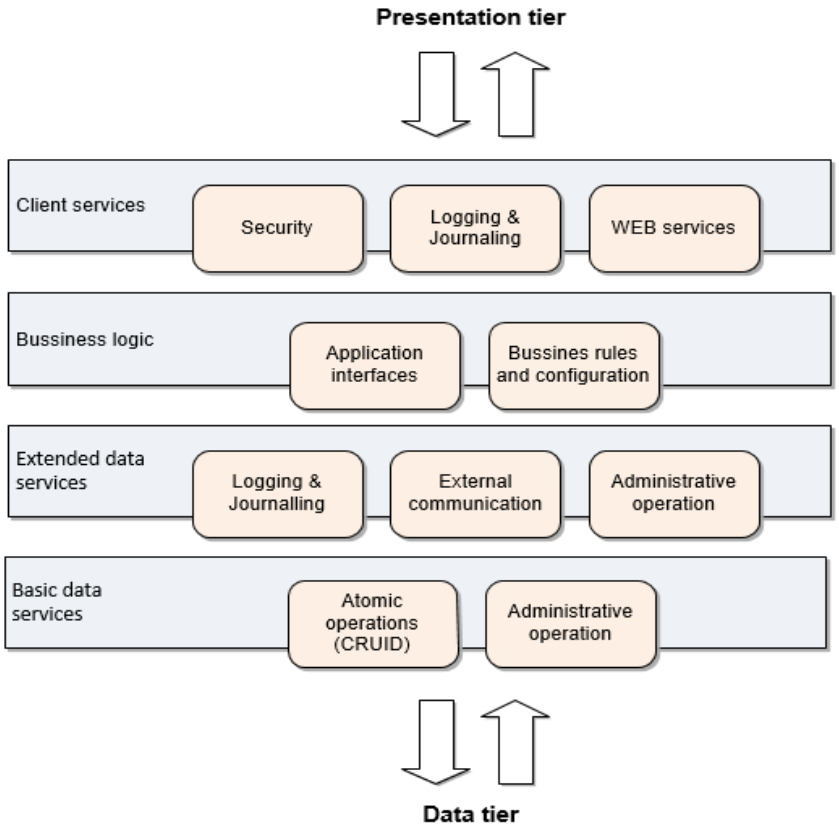


Figure: Service Application Tiers

Presentation Tier

The future system should be based on the Web client accessing the application as shown in the following picture:

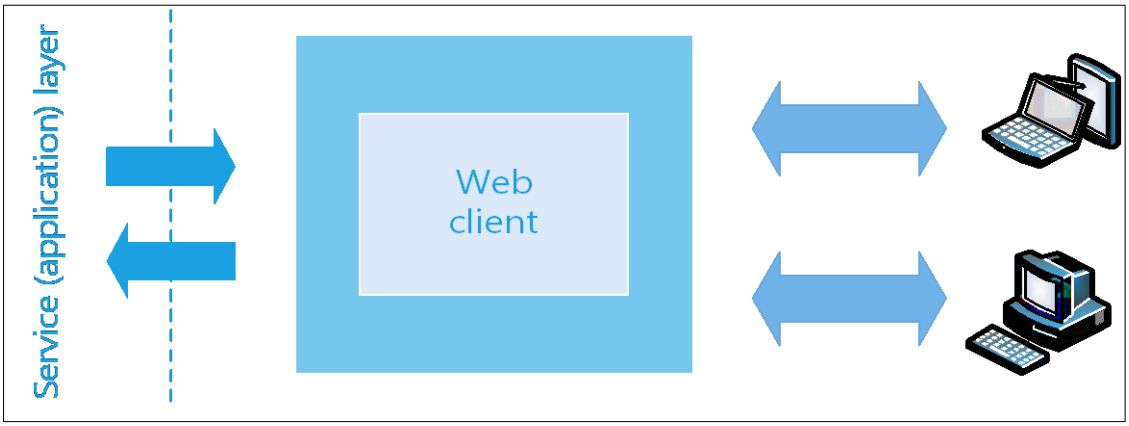


Figure: Presentation tier

Web clients are standard web-browsers like Chrome, Mozilla Firefox, Safari, Opera, Internet Explorer 10+ or Microsoft Edge.

Specifically, these components should be written using the modern WEB 2.0 features like asynchronous page loading and a combination of AJAX and JavaScript technologies for displaying and interacting with WEB pages and their underlying components. In addition, these components should be written using responsive design concepts, whereby the user interface automatically adjusts to the features (especially dimensions) of the device screen. An example of such support is a Bootstrap standard library for HTML, CSS, and JavaScript.

Because the web application should be accessed through a web browser, it will allow the application's availability on Windows, Linux, and Android platforms.

The complete graphical expression and user experience of all system elements (web application, reports) should be consistent throughout the system and in accordance with the customer's requirements.

Audit

The system will implement record audit capability. This capability is to record every change across all the related entities for every CRUD operation. The audit capability should be based around record versioning to keep a current snapshot of the record across all the related entities. The reasoning behind this capability is the requirement to have a record restore mechanism in central systems to a version, which would allow administrator to restore the data. This would enable the user to go back in time without requiring a full restore of a database backup.

Availability

System should be highly (95% or minimum 19 days downtime during the year, and minimum 1 to 2 days per month) available. System implementation should ensure that System as a whole withstands

failure of individual components. Further care should be taken to protect the System from any system failures.

Scalability

- It is expected that the load on System would increase with time and on specific events. System should be able to service the significant increase in load, without noticeable degradation in performance, by means of deploying additional hardware but without making any changes to existing code.
- System should be scalable.
- There should be a well-defined capacity management plan, clearly specifying hardware changes to be made servicing increasing load.

Flexibility

- The System should be able to address architectural and hardware configuration changes without a great deal of impact to the underlying system.
- System should be flexible to adapt legislation changes.
- The system should be flexible to enable easy updating in the future.

Portability

- System should be built using Open Standards & provide the interoperability with other platforms.

Usability

- Interface elements (e.g. menus) should be easy to understand
- The purpose of the system should be easily understandable
- The user documentation and help should be complete
- The help should be context sensitive and explain how to achieve common tasks
- The system should be easy to learn
- The interface actions and elements should be consistent
- Error messages will explain how to recover from the error
- Actions which cannot be undone will ask for confirmation
- A style guide should be used
- Attractiveness
- The screen layout and color should be appealing

User interface details

Flexibility of the user workspace could be available on several levels. The flexibility of application menus assumes that module-level menus could be adjusted per module. Proposed ordering of the menu should be closely related to the workflow and steps in the particular business processes. Regarding the overall layout of the screen, the system should be based on a modern and best of the breed fluid responsive design frameworks (i.e. by implementing BootStrap) allowing positioning of the main menu on the top or on the left/right side, while main portion of the screen should be occupied with the application content such as data entry forms, tables, grids, dashboards, reports etc. depending on the particular functionality being consumed.

Colors and typography of the application would be customizable up to the point by choosing between predefined themes that would be meticulously picked in order to maximize ergonomic

constraints and taking into account accessibility options such as higher contrasts for reduced eyestrain. Further adjustments would be possible by extending the theme set using the underlying CSS technology.

Alternative technology stacks to consider

If for some reason, Microsoft stack, previously recommended, could not be used or obtained for the new system; there are few good alternatives to be considered:

Oracle Technology Stack

- Application Framework: Oracle APEX (Application Express Framework) for Rapid Application Development of Web Apps
- Web-server: Glassfish
- RDBMS: Oracle 12c
- OS: Linux
- Reporting platform: BI Publisher (alternatively Jasper Reports)

LAMP Stack (Open source)

- Application Framework: PHP (and appropriate PHP Framework such as Zend or CakePHP)
- OS: Linux
- Web-server: Apache
- RDBMS: MySQL / MariaDB / PostgreSQL
- Reporting platform: Jasper Reports

Java Stack (Open source)

- Application Framework: Java (Java Server Pages)
- Application Server: Tomcat
- Web-server: Apache
- RDBMS: MySQL / MariaDB / PostgreSQL
- Reporting platform: Jasper Reports

CONCLUSION

Based on the GAP Analysis and current state of affairs, here are some key takeaways from this analysis:

- **Need for modernization of the LMIS system** based on the following arguments:
  - Lack of official support for the current legacy technologies
  - The uncertainty as to when the operating system will allow the old solutions to work (i.e. next version of the operating system will be disconnected from the required compatibility)
  - Lacking support for modern development tools as they do not support older technology, which makes development and maintenance difficult
  - No possibility of using more advanced architectures and paradigms in developing new solutions (such as pattern based design, unit testing and others) as well as the ability to apply modern frameworks (MVC, WCF, WebAPI, Angular, React etc.) and modern SOA oriented architectures
  - Lack of engineers who know how to use and work with such technology because new generations are not familiar with the same and poor availability of materials on the Internet
  - The lack of systematic source control should be addressed and fulfilled with a modern solution for source control with extended security and integration with modern development tools and Application Lifecycle Management paradigms (e.g. Team Foundation Server, GIT etc.
  - This always represent an excellent opportunity to revise, re-engineer/re-work and improve the business processes themselves, in order to achieve better integration with the environment, to achieve greater stability and scalability of the system, to better performance, and to generally exploit the benefits of modern technologies
  - Extend the life span of the software for the next ten or more years (if we compare with the lifetime of the existing solution)

- **Development of new web portals**
  - Since there is currently no functionality or interactivity/services for the Job Seekers (Unemployed) and Employers, this is an essential requirement and upgrade of the system in order to be able to fully engage in EURES exchange of Job Seekers Profile and Job Vacancies.
  - Another web portal could be one serving statistical data in the form of public BI self-service portal.

- **Development of new API/WS Gateway**
  - There is also a need for an API gateway providing for interoperability and data exchange with other institutions including EURES. Basically, this could be the server(s) hosting web-services, and one of the servers would host NCO DIM for integration with EURES platform.

- **Improving IT administration segment**
  - Introducing systematic centralized management of computers which would enable centralized software deployment, maintenance and inventory monitoring
  - Allowing for central user administration with Single Sing On (system logon) so that there is no need for separated logins

- Revising and improving backup procedures. Current backup strategy is based on a daily backup cycle. In the case of interruption of the service or a server malfunction, there would be a significant data-loss since last available backup contains the state from the previous day. This should be addressed by implementing a Log Shipping feature although there is a trade off as that might degrade overall performance.
- Allowing separated testing environment for the testing purposes which would allow for longer testing cycles without compromising production environment
- Introducing high-availability if possible by introducing NLB for web application servers and Failover Clustering for SQL Servers
- Usage of virtualization in order to simplify server management

- **Improving reporting and analytical capabilities**:
  - Developing Reporting System based on SQL Server Reporting Services
  - Introducing Data Warehouse and BI functionalities by employing SQL Server Integration Services for ETL and Analysis Services for advanced analytics

- **Back office empowered with collaboration tools, DMS platform and Record Management**
  - Introduce collaboration platform which would enable advisors, counselors and other EAM staff to have document libraries, e-learning materials and document management capabilities
  - Performance management tools (measuring KPI's)

Integration with EURES

Assuming that LMIS is modernized according to the findings and given recommendations, there are several phases to fully engage and integrate with EURES network. Ideally, all this phases could be achieved at once, depending on the budgeting and capacities to do so, but as this was not the case with most member states (especially considering new regulations), there is still a lot of work to do. We could approach this integration with a few smaller steps (phases):

- **Phase 1**
  - There are short-term goal that could be achieved earlier. Considering the structure and data already covered, Job Vacancies are ready for data exchange. There is a technical minimum of the mandatory fields in the data-set. This could be first a quick-win (assuming that infrastructure is in place and ready)
- **Phase 2**
  - Implementing ability to upload and include 3rd party Job Vacancies provided by other agencies in the LMIS system via API gateway (hosted by EAM)
- **Phase 3**
  - Development of new web portal (Berza rada) aimed at Job Seekers and Employers, providing services for online placing of CV by Job Seekers (and ability to manage their data by choosing which parts of the CV is visible) and ability to place Job Vacancies by registered Employers electronically. Later on implementing ability to upload and include 3rd party CV's provided by other agencies.
- **Phase 4**
  - Full integration between EAM and EURES. EAM is Montenegrin endpoint for all labor market information being exchanged with EURES electronically.