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CZECH TECHNICAL UNIVERSITY IN PRAGUE
FACULTY OF INFORMATION TECHNOLOGY
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Bachelor's thesis

Slovak government opendata

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13th May 2018

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In Prague on 13th May 2018

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Abstract

The concern of this bachelor thesis are the open data and their practical usages. The theoretical part of the thesis introduces the open data, describes their main attributes, discusses the world leaders in data opening, presents some of the most important institutions focusing on the open data and open government in the world and in the European Union and analyses the situation in Slovakia with the most interesting and impactful state and non-state projects.

The practical part focuses on the economic data of the city of Prešov, a municipality providing most useful open data in Slovakia. It analyses these data and describes the implementation of the main product of the thesis – a web application built on top of these data, which presents and connects them to the Slovak Business Register.

Keywords open data, open government, web application, Prešov, java

Abstrakt

Témou tejto bakalárskej práce sú otvorené dáta a ich praktické využitie. Teoretická časť práce uvádza otvorené dáta, opisuje ich hlavné atribúty, diskutuje svetových lídrov v otváraní dát, prezentuje niektoré z najdôležitejších inštitúcií, ktoré sa zaoberajú otvorenými dátami a otvoreným vládnutím vo svete a v Európskej únii a analyzuje situáciu na Slovensku spolu s najzaujímavejšími a najvýznamnejšími štátnymi a neštátnymi projektmi.

Praktická časť sa zameriava na ekonomické údaje mesta Prešov, ktoré poskytuje najužitočnejšie otvorené údaje na Slovensku. Analyzuje tieto údaje a opisuje implementáciu hlavného produktu tejto bakalárskej práce – webovej aplikácie postavenej na týchto údajoch, ktorá ich prezentuje a prepája s Obchodným registrom Slovenskej republiky.

Kľúčová slova otvorené dáta, otvorené vládnutie, webová aplikácia, Prešov, java

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Introduction

Impact of information is great nowadays. Internet helps people in everyday's life to get the information about almost everything almost immediately and to make decisions. Neither the public affairs did not escape this phenomenon. The society is getting more and more interested in transparency of state government. The idea of open data was created to satisfy this demand. They can provide the evidence that public money is being well spent and proclaimed policies are being implemented. Publishing state economy data, public procurements, tax declarations, even fortune of politicians or private companies and other data on public web servers is a common practice in many developed countries.

Thanks mainly to the European Union and other international institutions, but also enthusiasts and engaged citizens, more and more projects targetting electronisation, systematisation and publishing the data are being started also in Slovakia. The idea to publish in machine-readable form all that is not secret or personal data it still young, though, and often meets unwillingness or incompetence of the public institutions. As a result, quite often the data published by Slovak state and municipality governments, proclaimed to be open, are useless due to their non-machine-readable formats, incompleteness or lack of interconnectivity. Despite these problems, some progress has been made in this area in recent years and the number of datasets published by state institutions grows every day. Thanks to that there is a growing potential for software developers to create applications for manipulating, inteconnecting, analysing and presenting these data and thus turning them into useful information. This is one of the goals of this thesis.

open data of Prešov

Looking at the datasets published on the official website of Slovak government - data.gov.sk one easily discovers, that the most active of all the cities and towns in Slovakia in publishing the data is Prešov. Not only by number of

published datasets, but also by quality of the data this city in eastern Slovakia shares the most from its governing with its citizens. These data include all past contracts, invoices, orders and grants of the municipality. That is why these data were chosen for the purpose of this bachelor thesis.

Thesis Goals

The main goal of this thesis is to analyse, interconnect and present the economic open data of Prešov municipality to demonstrate their value and usefulness for the citizens. Focus is on interconnecting them by logical ties not only to each other, but also to other published open data in Slovakia, e.g. Slovak Business Register. This requires analyses of all published open data in Slovakia. The final product of the thesis is a web application to present the analysed and interconnected data. A final goal is to present the application to the Prešov city officials and try to convince them to publish and run it on their web servers, so it can serve the public. Other goals of this work are to explain the general concept of open data, the attributes, that such data need to have, describe international institutions focusing on the open data with influence on Slovakia, discuss the best practises and world leaders in opening the government data and introduce the most influential Slovak state and non-state open data projects and initiatives.

open data

This chapter is devoted to the problematics of open data. It provides knowledge about what the open data are, what are their main attributes, explains these attributes and informs about open data situation in Europe and some of the important organisations concerned with open data and open government.

1.1 Definition

open data are data that are accessible, can be used, re-used and redistributed by anyone for free (or no more than reproduction cost), subject only, at most, to the requirement to attribute and share-alike¹. For the sake of interoperability (i.e. ability of diverse systems and organisations to work together) the exact definition of open data is crucial. [1]

1.2 Requirements

Requirements that open data need to meet are the following: [2]

- **Open license**

The work must be available under an open license. Any additional terms accompanying the work (such as a terms of use, or patents held by the licensor) must not contradict the terms of the license.

- **Access**

The work shall be available as a whole and at no more than a reasonable one-time reproduction cost, preferably downloadable via the Internet without charge. Any additional information necessary

¹Share-alike is a copyright term, describing works that require copies or adaptations of the work to be released under the same or similar licence as the original.

for license compliance (such as names of contributors required for compliance with attribution requirements) must also accompany the work.

- **Open Format**

The work must be provided in a convenient and modifiable form such that there are no unnecessary technological obstacles to the performance of the licensed rights. Specifically, data should be machine-readable, available in bulk², and provided in an open format or, at the very least, can be processed with at least one free/libre/open-source software tool.

To understand the requirements properly, next part is devoted to explaining the most important points mentioned above.

1.2.1 Open licenses

open data need to be available under an open license. A licence tells anyone the conditions, under which they can access, use and share the data. Unless the data have a licence, data may be ‘publicly available’, but users do not have permission to access, use and share it under copyright or database laws. A license is open if it:

- allows free use and redistribution (including sale) of the licensed work.
- allows creation of derivatives of the work and their distribution under the same terms
- does not impose any fee arrangement as part of its conditions
- does not discriminate against any person or group

The next part looks at some of the most common open licenses.

1.2.1.1 Creative commons

Creative Commons (CC) is a non-profit organisation devoted to the idea of making the creative works available for others to legally build upon and share. Among other activities it provides free copyright licenses to make a simple and standardized way to give the public permission to share and use creative work on conditions of choice. [3]

²Data is available in bulk if the whole dataset can be downloaded easily. It is considered non-bulk if the citizens are limited to getting parts of the dataset through an online interface.

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1.2.1.2 GNU Free Documentation License

The GNU Free Documentation License is a copyleft license - which means that derivative works must be made available under the same or a similar license. The creators of the license recommend that it is used “principally for works whose purpose is instruction or reference”.

1.2.1.3 Open government licenses

Some governments have chosen to develop their own licenses for the data they publish. The good examples are France³ and Britain⁴.

1.2.2 Data file formats

File format is the digital base in which the information is stored. For the open data to be easily usable, the correct file format is crucial. Choosing the format depends mainly on the character of the data (e.g. structured data for statistics, geodata for geographic data displayed in map, etc.). The formats in which information is published can either be “open” or “closed”. If a file format is “closed”, this may be either because the file format is proprietary and the specification is not publicly available, or because the file format is proprietary and even though the specification has been made public, re-use is limited. Releasing information in a closed file format can cause significant obstacles to reusing the information encoded in it, forcing those who wish to use the information to buy the necessary software. Open format is a file format with a freely available published specification which places no restrictions upon its use. The preference from the open government data perspective therefore is that information be released in open file formats which are machine-readable.

³Available at <https://www.etalab.gouv.fr/licence-ouverte-open-licence>

⁴Available at <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Following are the data formats that are most-widely used for data publishing by government institutions. [5]

JSON

JSON is a simple file format that is very easy for any programming language to read. Its simplicity means that it is generally easier for computers to process than others, such as XML.

XML

XML is a widely used format for data exchange because it gives good opportunities to keep the structure in the data and the way files are built on, and allows developers to write parts of the documentation together with the data without interfering with the reading of them.

RDF

RDF makes it possible to represent data in a form that makes it easier to combine data from multiple sources. RDF data can be stored in XML and JSON, among other serialisations. RDF encourages the use of URLs as identifiers, which provide a convenient way to directly interconnect existing open data on the Web. RDF is still not widespread, but it has been a trend among Open Government initiatives, including the British and Spanish Government Linked Open Data projects.

1.2.2.1 CSV, XLS/XLSX

CSV, or Comma Separated Values can be a very useful format because it is compact and thus suitable to transfer large sets of data with the same structure. It is particularly important for the comma-separated formats that documentation of the individual fields are accurate. Furthermore it is essential that the structure of the file is respected, as a single omission of a field may disturb the reading of all remaining data in the file without any real opportunity to rectify it, because it cannot be determined how the remaining data should be interpreted. Many authorities have information left in the spreadsheet, for example Microsoft Excel. In this case, it is stored in XLS format, which is closed (and thus not suitable for open data), or XLSX format, which is partially open. This data can often be used immediately with the correct descriptions of what the different columns mean.

1.2.2.2 Text formats, PDF, TXT

Classic documents in formats like Word (closed format), ODF, OOXML, or PDF may be sufficient to show certain kinds of data - for example, relatively

stable mailing lists or equivalent. It may be cheap to exhibit in, as often it is the format the data is born in. The format gives no support to keep the structure consistent, which often means that it is difficult to enter data by automated means. Use of templates as the basis of documents is important to make it possible to pull information out of documents. Plain text documents (.txt) are very easy for computers to read. They generally exclude structural metadata from inside the document however, meaning that developers will need to create a parser that can interpret each document as it appears.

Most data need further processing (to save the data in the database, connect the data to other sources, etc.). As the data can be too big to manually process, manipulating with them should be automatable. The best formats to make automatization of the data more convenient are the structured ones like JSON, XML and RDF. On the contrary, images and text formats like PDF are very difficult to process. Spreadsheet formats (XLS/XLSX, CSV) are structured, but their structure is easily corrupted and manipulating data in these formats is usually less convenient.

1.2.3 Data openness levels

Tim Berners-Lee, the inventor of the Web and Linked Data initiator, suggested a 5-star deployment scheme for Open Data. This scheme, shown in 4.1 picture, is widely used (e.g. by British government open data) to rate given data based on their attributes like file format, structure, inteconnectivity, etc.

1.3 open data in the world

open data barometer is a World Wide Web Foundation's global measure of how governments are publishing and using open data for accountability, innovation and social impact. [7]

Barometer ranks governments on:

- readiness for open data initiatives
- implementation of open data programmes
- impact that open data have on business, politics and civil society

The ranking made by open data Barometer in 2016 is the following:

1. Great Britain
2. Canada
3. France
4. USA
5. South Korea

29. Slovakia
31. Czech Republic

1.3.1 Great Britain's open data

Great Britain is the global leader in opening government data. It scored 100/100 in the overall assesment of the prevalence of open data initiatives of open data barometer. There are several reasons why the UK's open data are ranked so well. One of them is its 'Open Data Readiness', which is the policy framework for the release of open data. It includes having national guidelines that are applicable to specific sectors, and these guiding principles ensure a smooth release of open data that can benefit anyone that wishes to access it.

Government's Digital Service Standard provides guidelines on data publishing. A number of regional or city initiatives are integrated into the data.gov.uk portal, too, such as Open Manchester, Leeds Data Mill, Birmingham Open Data, Bristol City Council Open Data, to mention just a few.

The UK Government Licensing Framework provides a policy and legal framework for licensing the use and re-use of public sector information across the public sector. It sets out best practices, standardises the licensing principles for government information, mandates the Open Government Licence (OGL) as the default licence for Crown bodies and recommends OGL for other public sector bodies (see 1.2.1.3).

Following in the UK's footsteps in open data guidelines would be a good place to start for other countries hoping to improve in this area. [8]

One of the interesting applications of UK's open data is the **LMI For All** project. It is an online data portal, developed by the UK Commission for Employment and Skills, which brings together existing national sources of high quality labour market information (LMI) that can inform and help people make right choices about their careers. The online portal includes LMI that can help answering the questions people ask when thinking about their careers, like how much people earn or what type of persons do what kind of jobs, etc. It includes information from the Annual Survey of Hours and Earnings, the Labour Force Survey, the Employer Skills Survey and Working Futures. All of its data are made freely available via an Application Programming Interface (API) for use in websites and applications.

Other interesting applications built using UK's open data can be seen at data.gov.uk/apps. These include Car Insurance Comparison Application, All GB Railway Stations, Inheritance Tax Calculator UK and more.

1.3.2 Open Government Partnership

Open Government Partnership (OGP) is the international governments initiative, which was launched in 2011 by 8 founding governments (Brasil, Indonesia, Mexico, Norway, Philippines, South Africa, United Kingdom and United States). The focus of the initiative is the improvement of government by promoting transparency, effectiveness and responsibility, harnessing new technologies and setting up institutions, which help citizens to participate in governing. To become a member of OGP, participating countries must commit to uphold the principles of open and transparent government by endorsing the Open Government Declaration. In total there are over 70 OGP participating countries and 15 subnational governments and together they have made over 2,500 commitments to make their governments more open and accountable. [17]

1.3.3 European Union initiatives

European Union Open Data Portal, set up in 2012, is the open data portal of the European Union containing datasets that are collected and published by the European Institutions and other EU bodies. It provides a standardized catalogue of EU open data and a list of applications and web tools reusing these data. [10]

European Data Portal is an initiative of the European Commission, and is part of the Digital Single Market. It was created to gather Public Sector Information of the 28 European Member States and the four EFTA (Norway, Iceland, Switzerland and Liechtenstein) countries. Information regarding the provision of data and the benefits of re-using data is also included. Going beyond the harvesting of metadata, the strategic objective of the European Data Portal is to improve accessibility and increase the value of Open Data. Within the Portal, sections are dedicated to searching datasets, providing data, using data, training and library. It also contains ratings of open data of every involved country. [11]

open data in Slovakia

Slovakia ranked 29th in the above mentioned open data barometer for 2016. It moved 7 places up the ranking since 2015. European Data portal publishes factsheets, which summarize readinnes, challenges and shortcomings of open data in each member country. According to 2017 factsheet dedicated to Slovakia, the main possitives of Slovak open data are: presence of action plan of Open Government for 2017-2019; presence of national guidelines on data publication; data licensing 100% free of charge and big amount of regional data initiatives. On the contrary, the main negatives/barriers are: less then 25% of the data uploaded automatically; lack of integrated regional portals; passive approach of Open Data holders, mainly by municipalities and lack of promotion of prescribed technical standards. [12]

2.1 Political support

A lot of positive steps were made towards open government in Slovakia during the short government of Iveta Radičová (2010-2012). Most notable ones were making publishing of contracts on the internet mandatory (see 2.3.1) and introduction of electronical auction for public procurements. On 20th September 2011, the Government of the Slovak Republic joined the Open Government Partnership and in 2012 approved the first action plan for the Open Government Initiative for years 2012-2013, which created an open data portal. In June 2016, a new office – Deputy Prime Minister’s office for Investments and Informatization was set up, with one of the main tasks being creation and implementation of uniform state policy in the field of informatization of the society. In March 2017, Open Government Partnership National Action Plan for years 2017-2019 was adopted by the Slovak government. This plan addresses open data (by formulating new commitments on publicly available APIs and open source software), open education, public policy making and open justice.

2.2 Slovak open data portal - data.gov.sk

Official government open data portal - data.gov.sk was launched in 2013 as part of the Open Government Initiative, which aims to improve governance through increasing transparency, efficiency and accountability. Declared goals of the portal are publishing data and metadata (data describing data like column descriptors, etc.) in machine-readable form using open standards and licenses. The website allows users to search datasets by organisation that published them, license, file formats and tags. It also supports a full-text search by name and description of a dataset and even by its location on the map. Following are some statistics from the portal (March 2018):

- 4399 unique visitors on average per month
- 30% of the visitors foreign
- most datasets available in CSV format
- 99% of the datasets machine-readable
- 66 organisations publishing data
- 1425 datasets available

The most active organisations by number of published datasets:

Organisation	Number of datasets
Slovak Statistical Office	625
Public Procurement Office	64
The city of Prešov	58
Ministry of Interior of the Slovak republic	57
Central Agricultural Control and Testing Institute	43

Table 2.1: Top organisations on data.gov.sk

The most commonly used file formats (many datasets are published in more than one file format):

File format	Number of datasets
CSV	877
XML	336
HTML	218
XLSX	185
JSON	11

Table 2.2: Top file formats on data.gov.sk

The most commonly used licenses (see 1.2.1):

License	Number of datasets
Creative Commons Attribution Share-Alike	737
Creative Commons CCZero	87
Creative Commons Attribution	24
Other non-commercial	14
GNU Free documentation license	7

Table 2.3: Top licenses on data.gov.sk

The most common tags:

Tag	Number of datasets
Statistics	607
Key tables	190
Elections	177
Key Indicators	98
Parliament	63

Table 2.4: Top tags on data.gov.sk

2.3 Other state projects

Beside the above-described official Slovak open data portal, several other big state-run projects are present. The most important ones are Central Register of Contracts and Business register.

2.3.1 Central Register of Contracts

Started on 1st January 2011, Central Register of Contracts (available at crz.gov.sk) is a website containing contracts (with their appendices and attachments) concluded by so-called obliged entities - Government Office, ministries, central government authorities, public bodies and their subordinate organisations (contributors, budgetary organisations, etc.) since the beginning of 2011. As of March 2018, the database contains 1 578 659 contracts. All contracts concluded prior to 2011 are available at older address zmluvy.gov.sk. The operator of both websites is the Government Office of the Slovak Republic.

The register has proven to be successful. The procurement costs of public orders fell by almost one third in the very first year of the register's operation due to reduced financial mismanagement. Iveta Radičová, former Slovak Prime Minister during whose government the project was started, described its success in these words:

“Following the first year of the register’s operation, savings in public finances amounted to an average of 30 percent of costs. There were also some areas – for example, the transport sector – where the savings reached 50 percent. The Office of the Government alone saved EUR 3.5 million in the first year of the register’s operation. The publication of a contract also prevented an overpriced purchase of flowers for EUR 10 000 at the Ministry of Education.” [15]

2.4 Business register

The Business Register (available at orsr.sk) is a public registry that contains particular information specified by the law about individual entrepreneurs, companies and other legal entities. The registry is owned and maintained by the Ministry of Justice of Slovakia. It can be searched by business name, identification number, registered seat, registration number or name of a person. The register provides information from January 2001 onwards.

2.5 Non-state initiatives

In addition to the official projects of Slovak republic and municipalities, there are several civic associations, non-profit organisations and private companies dedicated to state open data. Some of them are trying to improve the quality and usefulness of the available data, others interconnect them with other sources and present them in an attractive form. Most often their main goal is to bring more transparency to public spending and state government. Next section looks at the most important ones.

2.5.1 Slovensko.digital

Slovensko.digital is a civic association aimed at improving the quality of state digital services in Slovakia. Their goals are summarized on their website:

“We want the digital services of the state to be simple, meaningful and have a normal price. We need to increase the transparency and efficiency of spending of public resources as well as the participation of the professional public in the electronisation of public administration.”

In accordance with these goals, slovensko.digital set up the platform for all IT specialists, who want to join the discussion about state IT projects. This civic association’s members also developed a methodology that focuses on more than 50 criteria of project success and use it to systematically rate state IT projects and alert the public to the risky ones in one of their project called

Red Flags. Thanks to this, slovensko.digital was able to stop a couple of senseless state projects, saving Slovak citizens hundreds of millions of euros. They've also started several projects as part of ekosystem.slovensko.digital, some of which provide APIs to public data sources (otherwise only accessible on websites) like Register of legal entities, Central register of contracts, Public procurement journal, Business journal, Registry of financial statements and more.

2.5.2 Finstat

Finstat was started in 2013 as a web portal, which helps people to freely assess financial health of Slovak companies. It connects data from various data sources: ministries, state insurance companies, Business register, Statistical office, Slovak Chamber of executors, Trade Journal, Register of entrepreneurs, Register of financial statements, Register of bankrupts, Czech statistical office and many more and by their processing and analysing provides complex information about Slovak companies, individual sectors and groups of entrepreneurs. The portal also helps media and non-profit organisations to analyse companies and investigating corruption cases by development of analyses and making the data of the portal accessible for them. A lot of its features are for free and some features, like API access and datasets in CSV are parts of paid packages.

2.5.3 Uvostat

Uvostat is a project that processes public procurements data, analyses and presents them in the form of statistics and interactive graphs. The statistics include most valuable procurements, most procurements by company or by contracts concluded. The website enables searching in the list of suppliers and even fulltext search in names and contents of the procurements. It also provides noticator for tenders for new positions in state offices, which can be used by people looking for jobs to inform them that a new position which fits their profesion and location is being opened. The interesting fact about the project is that it has been developed by only two people.

2.5.4 Otvorené zmluvy (Open contracts)

Otvorené zmluvy is an investigative project of Slovak anti-corruption initiative Aliance Fair-play and Transparency International, which helps citizens to read, search and assess contracts concluded by state and state institutions, which are being published by law since 2011. It offers automated analyses and offers general public to join discussions (crowdsourcing), trying to draw attention to suspicious contracts.

2.5.5 Datanest

Datanest was also created by Aliance Fair-play as a source of information about management of Slovak public money as part of their anti-corruption initiatives. It serves mainly journalists, analytics, watchdog organisations, but also engaged citizens. It contains data generated by state since 1990, which in some cases can't yet be obtained in electronic form elsewhere.

2.5.6 foaf.sk

Foaf.sk draws information about Slovak companies from publicly available Business register, Business journal, Registry of financial statements, database of Social insurance agency debtors, Financial Administration, and other databases. The website uses graph algorithms to look for and display deeper connections between people and companies in Slovakia, which enables users to quickly search for and display relations between companies and entrepreneurs. The name FOAF comes from the English acronym *Friend Of A Friend* and refers to the phenomenon of the small world networks.

Analyses of the Prešov open data

The city of Prešov is the only municipality in Slovakia, which is in the top 10 organisations by number of published datasets on data.gov.sk (see 2.2). Prešov is also the only municipality in Slovakia, that provides open geodata. At ITAPA⁵ 2017 awards, the city's webgis geodata⁶ project was awarded 3rd place. Mariana Hurná, Prešov's main IT coordinator was awarded as Best IT specialist of Slovak municipalities in years 2008, 2009 and 2012. The city maintains egov.presov.sk information system portal to enable its citizens access to useful information about city data. Published here are data about street names, members of municipal government, members of municipal police, camera systems locations, demographic structure of citizens of the city, drawing of the municipality budget, register of petitions, tax debtors and more. Prešov is by all means a very good example of municipality that works towards greater transparency by processing the data it collects from the citizens. Unlike most other Slovak municipalities, its employees don't only do the necessary minimum to comply with the law, but also do the additional work to provide useful data applications and progress to its citizens.

3.1 Prešov contracts, grants, invoices and orders

Slovak municipalities are obliged to publish data about orders, contracts and invoices of institutions like City Office, Municipal Police, Registry office and all budgetary organisations of which they are founders. This is mandatory by law 211/2000⁷ in Slovak collection of laws. Additionally, Prešov municipality

⁵ITAPA events (Information Technologies and Public Administration) are the most important and well-known IT events in Slovakia since 2002. [18]

⁶data about geographic locations, that can be displayed in a map

⁷Available at <http://www.zakonypreludi.sk/zz/2000-211>

3. ANALYSES OF THE PREŠOV OPEN DATA

publishes all applications for grants to comply with its internal binding regulations. Prešov publishes this data on its website egov.presov.sk, as well as on the national open data portal data.gov.sk, in various formats (XML, JSON, XLSX, and PDF) under Creative Commons Attribution license (see 1.2.1). Next sections look at the data that are used in practical part of these bachelor thesis - contracts, invoices, grants and orders. They provide basic statistics of each of these datasets and describes their attributes. All the statistics were collected from egov.sk on April 8th 2018.

3.1.1 Contracts

Total published contracts	6027
Oldest contract published on	August 2nd 2011
Latest contract published on	April 6th 2018

Attribute	Data type
id (central number)	Integer
type	String
contracting parties	String
subject	String
total price	Integer
currency	String
date of signature	Date
date of release	Date
name (detailed type)	String
parties' national identifiers	String
parties' addresses	String
notes	String
main/appendix indicator	String
effective date	Date

Table 3.1: Contracts data attributes

3.1.2 Invoices

Total published invoices	28511
Oldest invoice published on	May 26nd 2011
Latest invoice published on	April 6th 2018

Attribute	Data type
id (internal number)	Integer
name of the organisation	String
supplier	String
payment purpose description	String
total price	Integer
currency	String
id of contract	Integer
id of order	Integer
release date	Date
supplier national identifier	String
supplier address	String
payout status	String
office	String
invoice number	Integer
final/deposit indicator	String
status	String

Table 3.2: Invoices data attributes

3.1.3 Orders

Total published orders	28511
Oldest orders published on	May 26nd 2011
Latest orders published on	April 6th 2018

Attribute	Data type
id	Integer
supplier	String
order text	String
total value	Integer
currency	String
creation date	Date
release date	Date
supplier national identifier	Integer
supplier address	String
office	String
name of approver	String
function of approver	String
date of issue	Date
release notes	String
status	String
contract id	Integer
year of contract	Integer

Table 3.3: Orders data attributes

3.1.4 Grant applications

Total published grant applications	825
Oldest grant app. published in	2012
Latest grant app. published in	2018

Attribute	Data type
year of dotation	Integer
type	String
status	String
event	String
approved amount	Integer
currency	String
applicant	String
applicant's address	Integer
applicant's city	String
applicant's national identifier	Integer

Table 3.4: Grant applications data attributes

Implementation

As mentioned in the previous chapters, the main output of this bachelor thesis is a website built on top of the economic open data of Prešov. This website not only presents these data and enables searching them, but also provides added value by connecting them to the Slovak Business Register data. Next sections look at how this web application works, how it manages and presents the data and what technologies it uses. It is divided into four sections dedicated to: data retrieval and processing into database; implementation of the web application; section describing it with screenshots from running application and finally, the comparison between this solution and other applications focused on open data in Slovakia.

4.1 Data management

4.1.1 Data from Prešov web server

As described in chapter 3, the main concern of this web application are data about Prešov's contracts, invoices, orders and applications for grants. These data are being updated daily and can be downloaded in various formats, including XML and JSON, which are structured and thus most suitable for parsing and further use (1.2.2). JSON format is a more modern alternative to XML and is easier and faster to parse, less memory-consuming and more intuitive to read. That's why the data from Prešov's web servers were downloaded in this format for the purpose of this application. To enable fast searching and accessing these data, they need to be stored in a database. *PostgreSQL*⁸ was chosen as the database management system. To fill the database with the JSON data, a conversion from JSON to SQL is needed. In this case, this conversion is done by a script written in the *Python* programming language.

⁸PostgreSQL is an open source relational database management system developed by a worldwide team of volunteers. It supports transactions, subselects, triggers, views, foreign key referential integrity, and sophisticated locking and runs on multiple platforms.

This script takes JSON file as an input along with the parameter indicating what kind of data are being inserted (“i” for invoices, “c” for contracts, etc.), parses the a JSON file, constructs the SQL CREATE statements to create the database table and indexes for the chosen columns, transforms each JSON object into an SQL INSERT statement and outputs these statements. The result is a series of SQL statements which can be stored as an SQL script and used to fill 4 database tables - Contracts, Invoices, Grants and Orders. The process of getting the data from the web server and transforming it to fill the database is described in the diagram 4.4.

4.1.2 Data provided by slovensko.digital

The data retrieved from Prešov’s website contain national identifiers (IČO - organisation identification number) of contract parties, grant applicants and suppliers (see 3.1). With these identifiers, a given legal entity can be searched in Slovak Business Register (see 2.4). The problem of getting the data from this register, which does not provide any API was targetted and solved by slovensko.digital by providing a free API to this register as part of their ekosystem.slovensko.digital project (see 2.5.1). Through this API it is possible to retrieve information about a legal entity with given IČO in JSON format.

4.1.2.1 Data retrievable by IČO

To be able to use the above-mentioned API to retrieve the full data about a legal entity by its IČO, the user needs to use an intermediary API, which provides consolidated basic data about the legal entity and also serves as a gateway to other services providing more detailed information. To use this premium intermediary API, an *Authorization token* is required, which needs to be included in the API’s URL request header. This token is provided by slovensko.digital upon email request, in which one should describe the purpose of the data usage.⁹

The result of a successful request contains the national and tax identifiers, name of the subject, address attributes, dates of establishment and termination, registration office attributes, two system columns describing dates of creation and modification of the entry and finally the URLs to APIs providing more detailed information - full data from Business Register and Register of Accounting Entities.

Following is the example of JSON data returned by this API for legal entity with IČO 36421928, which is slovensko.digital:

⁹ The complete guideline describing how to use the API and retrieve the authorization token is available here: <https://ekosystem.slovensko.digital/premiov-api#access-token>


```

{
  "id": 1358414,
  "cin": 50158635,
  "tin": 2120264674,
  "vatin": null,
  "name": "Slovensko.Digital",
  "formatted_address": "Staré Grunty 6207/12, 841 04 Bratislava –  
mestská časť Karlova Ves",
  "street": "Staré Grunty",
  "reg_number": 6207,
  "building_number": "12",
  "postal_code": "841 04",
  "municipality": "Bratislava – mestská časť Karlova Ves",
  "country": "Slovenská republika",
  "created_at": "2016-06-09T12:26:10.521084Z",
  "updated_at": "2017-06-30T02:10:45.967257Z",
  "established_on": "2016-01-29",
  "terminated_on": null,
  "vatin_paragraph": null,
  "registration_office": "MV SR",
  "registration_number": "VVS/1-900/90-48099",
  "formatted_street": "Staré Grunty 6207/12",
  "street_number": "6207/12",
  "rpo_organisations": [
    {
      "id": 6562824,
      "url": "https://datahub.ekosystem.slovensko.digital/api  
/data/rpo/organisations/6562824"
    }
  ],
  "ruz_accounting_entities": [
    {
      "id": 1617045,
      "url": "https://datahub.ekosystem.slovensko.digital/api  
/data/ruz/accounting_entities/1617045"
    }
  ]
}

```

4.1.2.2 Full Business Register data

Using the URL contained in the above-mentioned data under *rpo_organisations* attribute, one can obtain full data available for the given entity in the Business Register. These include: list of addresses, legal forms, organisation names, alternate names, predecessors, successors, registration numbers and statutes (with name, address and statutory type). Included are also entity's economic data like economic activity types, money deposits put into the organisation (with name of the depositor and the amount), company equities (investment, paid and approved amounts), shares (with identifiers of shareholder and share price) and stakeholders (name, address and type). All of these entries contain dates of effectiveness from and to, which can be used to construct the history of the legal entity.

4.1.2.3 Register of Accounting Entities data

The URL under *ruz_accounting_entities* attribute points to an API which provides access to data collected from Register of Accounting Entities. This API, however, is only in alpha version and thus only provides limited information like the size of an organisation (by number of employees), ownership type, economic activity, municipality and district.

4.2 Web application

4.2.1 Used technologies

The web application was implemented using *Java Platform, Enterprise Edition* (Java EE) technology. *Java Servlet Technology* was used together with *JavaServer Pages* (JSP) to generate web pages based on user request. The application was deployed to *WildFly* application server. *Apache Maven* was used for building the application and dependency management, and *Hibernate ORM* for persistence layer.

4.2.1.1 Java EE

Java Platform, Enterprise Edition is a collection of Java APIs that software developers can use to write server-side applications. Its architecture provides services that simplify some common challenges faced by developers building web applications like client requests handling or working with a database.

4.2.1.2 Java Servlet Technology and JSP

Java Servlet Technology was created as a way to provide dynamic, user-oriented web content. A servlet is a Java class used to respond to various, most often HTTP requests. JavaServer Pages technology is also used to create web content based on user request. Unlike Java servlet, JavaServer page is not a Java class, but a HTML-like document supporting Java scriptlets, which are pieces of Java-code.

4.2.1.3 Hibernate

Hibernate ORM (Object-relational mapping) is a free Java tool, which provides a framework for mapping an object-oriented domain model to a relational database. Its primary feature is mapping from Java classes to database tables and Java data types to SQL data types. Hibernate also supports data querying by generating SQL calls, relieving the developer from manual object conversion.

4.2.1.4 WildFly

WildFly, formerly known as JBoss, is a free open-source application server implementing Java EE specification. Being implemented in Java, it can run on multiple platforms.

4.2.1.5 Maven

Maven is a build automation tool used mostly in Java projects. It addresses two important parts of software development - describing, how software is built and its dependencies. It is configured by an XML file called POM (Project Object Model). Maven comes with pre-defined targets for performing tasks as code compilation and packaging. It dynamically downloads libraries and plugins from either its own central repository or ones defined in POM file.

4.2.2 Architecture

The architecture of the web application is a classic Java Servlet/JSP architecture. The HTTP request is handled by the application server, which finds the correct Java servlet. The servlet then uses application Java classes to do the business logic like retrieving and processing the data from the database or through slovensko.digital's API (this includes parsing the JSON data). After doing the necessary operations the servlet forwards the request to the appropriate JSP document, which handles the UI part. This architecture is described in the diagram 4.5.

4.3 The website

This section describes the application from the user's point of view by describing the contents of pages displayed after successful call of all the main possible requests (show all contracts, grants, invoices, orders, company, order, contract details, statistics and more) and providing screenshots of these pages.

4.3.1 Navigation menu

Present at the top of every page, this component provides simple navigation between all the main pages of the application. It contains links to the following pages: all contracts, all grants, all orders, all invoices, statistics of these data and finally the "About" page containing basic information about the application and references to the data sources.

4.3.2 All records pages

The core of the application are four main pages presenting: all contracts, all grants, all orders and all invoices of the Prešov city. Each of them uses

the same layout: top menu toolbar for navigation, data filter, basic statistics (count of records and their total value) and a table containing the data of a given record. The table is paginated - each table page contains 100 records and links to the first, last, previous and next page. If a table contains a name of a company or an entrepreneur (whether it is contract party, grant applicant, or supplier), this name is a link navigating to the detail page of the given company or entrepreneur (presenting the data from the Business register).

4.3.2.1 All Contracts

This page providing data of all Prešov's contracts serves as the home page for this application. It presents all contracts from the database. The contracts table contains columns showing the name of the contractor (company or entrepreneur), with which the city of Prešov concluded the contract, subject of the contract (max. first 100 letters), date of signature, contract price and link to the contract detail page. The page filter enables users to filter contracts by the name of the party, subject of the contract and signature date (fields from and to) (see picture 4.6).

4.3.2.2 Contract detail

This page provides complete information of the given contract from the database, including those fields that are not displayed on the all contracts page (see picture 4.7).

4.3.2.3 All Grants

This page provides data of all Prešov's orders. The data table contains columns showing the name of the company or entrepreneur, which applied for given grant, related event description (maximum first 100 letters), year of grant and approved money amount. This page's filter enables users to filter grants by the name of the grant applicant and grant event (see picture 4.8).

4.3.2.4 All Orders

This page provides data of all Prešov's orders. The data table contains columns showing the name of the supplier (company or entrepreneur), text of the order (maximum first 100 letters), its value, status, issue date and a link to the order detail page. The data filter enables filtering by the name of the supplier, grant text and issue date (see picture 4.9).

4.3.2.5 Order detail

This page provides complete information of the given order from the database, including those fields that are not displayed on the all contracts page (see picture 4.10).

4.3.2.6 All Invoices

This page provides data of all Prešov's invoices. The data table contains columns showing the name of the supplier (company or entrepreneur), payment description (maximum first 100 letters), its value, payment status, invoice completeness status, release date and a link to the detail page of related contract or order. The data filter enables filtering by the name of the supplier, payment description and release date (see picture 4.11).

4.3.3 Legal entity detail

The detail page for a legal entity displays the data provided by slovensko.digital from Slovak Business Register (see section 4.1.2). A user can navigate to this page by clicking on the name of the company from any webpage containing such link (like all contracts, grants, contract detail, etc.). On the top of this page a basic information about given entity is displayed, with data like IČO, current address, founding date, legal form, ownership type, number of employees, SK NACE classification¹⁰, place and number of registration and an URL to finstat.sk (see 2.5.2 section) page, which provides even more detailed information about it. Right under this basic info section, this page provides the tables with all the Prešov's contracts, grants and orders, that the given entity is involved with. Under these tables, the rest of the available data from the business register follows: tables of economic activities, legal statuses (former and current), statutory bodies, stakeholders, predecessors and successors (if any), equity capital, deposits, former names and addresses, alternate names, authorizations to act on behalf of the entity and past legal forms (if any) (see pictures 4.12, 4.13).

4.3.3.1 Statistics page

The statistics page presents some calculated statistics based on the data presented on the other pages. It is divided into several tabs containing tables, each with top 100 records by specific criteria. It provides: top companies by the total value of paid invoices, top companies by number of paid invoices, top invoices by paid amount, top grants by approved grant amount, top contracts by price, top orders by value. For a better idea, see the 4.14 and 4.15 pictures.

4.3.4 Record not found

The website handles the situations, when the contract, order or person with given identifier (contained in the url of the request) was not found in the database by displaying the appropriate message (Contract/Order/Legal Entity with given identifier wasn't found).

¹⁰NACE (Nomenclature of Economic Activities) is the European statistical classification of economic activities. NACE groups organisations according to their business activities. [19]

4.4 Comparison and possibility of improvements

This section focuses on a comparison between the web application created as part of this thesis and other applications presenting open data in Slovakia. It also discusses possible future enhancements, that could make the application more informative and useful for the users.

4.4.1 Comparison of the solution with other projects

There are several interesting projects focusing on open data in Slovakia and some of them are described in the 2.5 section. Some present similar type of data as this application, but all of them are, naturally, more elaborate, as they are being continuously developed for a much longer time. One of them is the *Uvostat* (see 2.5.3 section) project, which focuses on public procurements and also provides similar type of statistics (top 100 contracts by value, top 100 companies by the number of finished procurements, etc.). Additionally, the project also presents the data in a form of visually appealing interactive graphs and also supports more advanced data search. Some similarities can be found with the *Finstat* project (see 2.5.2 section) which also presents data about Slovak companies and entrepreneur. Finstat also takes the data from the Business register, but adds information from other sources (that is why a link to this website is included in the party detail page of this application). It has a much more elaborate layout and presents some data in colorful graphs. In general, there are very few projects with focus on economic data of Slovak municipalities. A lack of activity and passive approach of the Slovak municipalities was also mentioned in the 2017 European Data Portal factsheet for Slovakia (see 1.3.3).

4.4.2 Possible improvements

There are many aspects, which could be improved in this application. One big improvement, that would increase the application's performance and enable more advanced statistics would be not to download the data about a legal entity through the API on each request, but instead store them in the database. This would require a separate program, which would go through all the database records (contracts, invoices, orders and grants), download, parse and store the data about each contractor, supplier, money receiver or grant applicant in the database. This would, for example, allow searching the natural persons with relationships with the companies receiving money from the city budget and make it easier to detect suspicious connections. Other important enhancement would be to include the PDF documents for each contract, order or grant application. This would, however, require a cooperation with the city (granting access to these data), or some complicated algorithm to retrieve these documents from the city's website (the documents are available

4.4. Comparison and possibility of improvements

there, but are not exportable, but instead downloaded upon request for each record). Also, the website only contains contracts, grants and invoices related to the Prešov city itself and not to the subordinate organizations (kindergartens, primary and art schools, senior facilities, etc.). These records are also made available at the website, but are not part of the Open catalogue and thus are difficult to download (they are only exportable from the table view, which doesn't allow downloading more than 10 000 records). In this case, too, a cooperation with the city would be needed to make them provide direct access to these data. A data export would also be a nice feature to have. A lot of improvements could also be done on the UI part of the application, e.g. more advanced layout for the legal entity detail page.

Conclusion

The main goal of this thesis was to analyse the economic data of the Prešov municipality connect them to other national sources of the Slovak government data and implement the web application to present these data and prove their usefulness. To reach this goal, an analysis of the open data situation in Slovakia had to be done. This included research of the Slovak government data policies and state and non-state projects and initiatives working with the government open data (done in chapter 2). The main goal was reached by the analysis of the published Prešov's contracts, invoices, orders and applications for grants, their attributes, processing them into the database and implementation of the web application. This application presents these data and connects them to each other and to the Slovak Business register (see chapter 4). It has been delivered to the officials of the Prešov municipality and offered for use, but they did not respond in time. If they accept the offer and provide their web servers to host this web application, it could be further developed and improved and made available on the internet. If this happens, the application might bring even more transparency to the Prešov's city public spending, which is the main idea behind this bachelor thesis and open data in general.

Other objectives of the thesis were to provide an introduction to the open data, provide their definition, explain their attributes and list and describe the top organisations focused on the open data and open government in the world, which influence Slovakia. These objectives were fulfilled in chapter 1 and section 1.3.

Figures

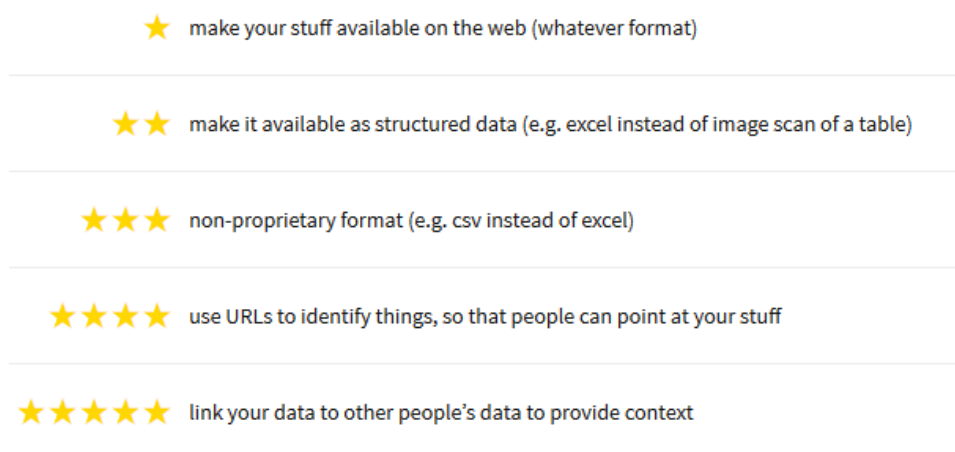


Figure 4.1: 5-star data openness rating scheme. [6]



Figure 4.2: LMI for all data providing scheme. [9]

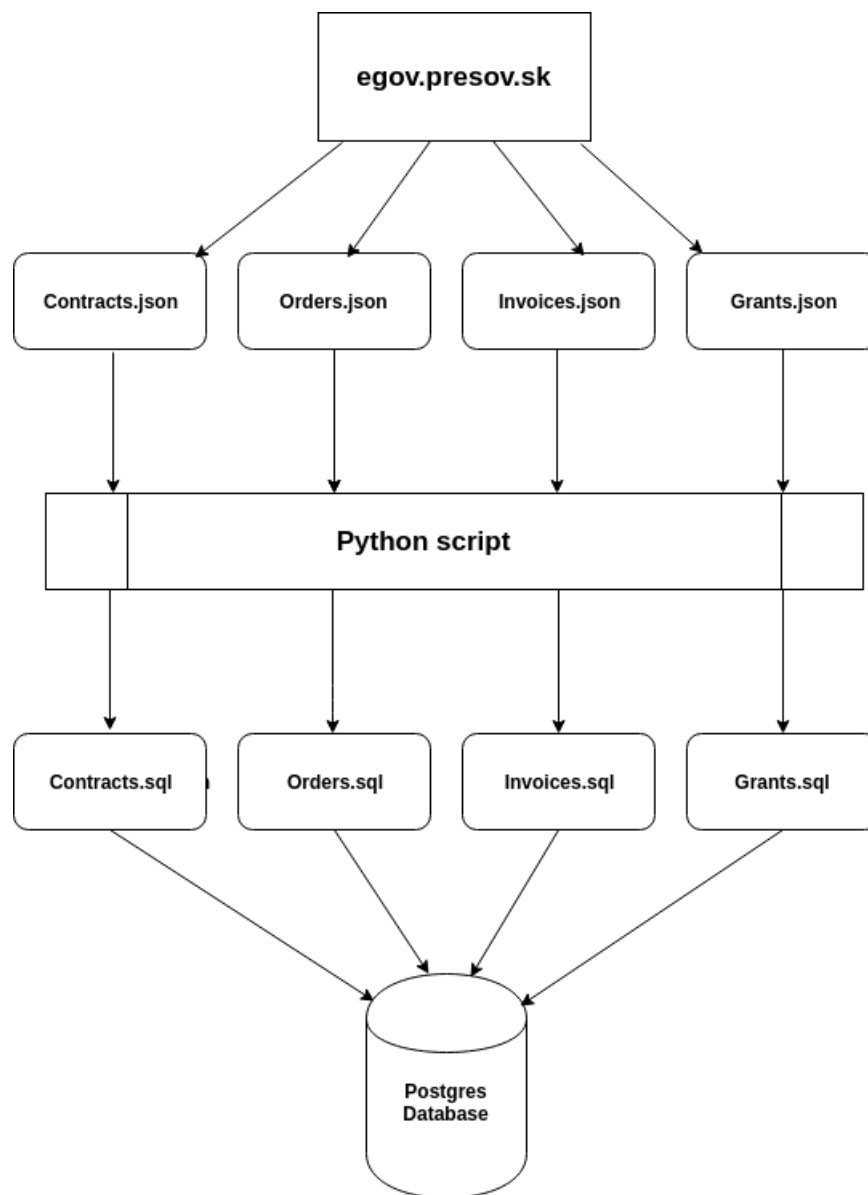


Figure 4.4: Diagram describing retrieving the data from egov.presov.sk and transforming it to initialize database.

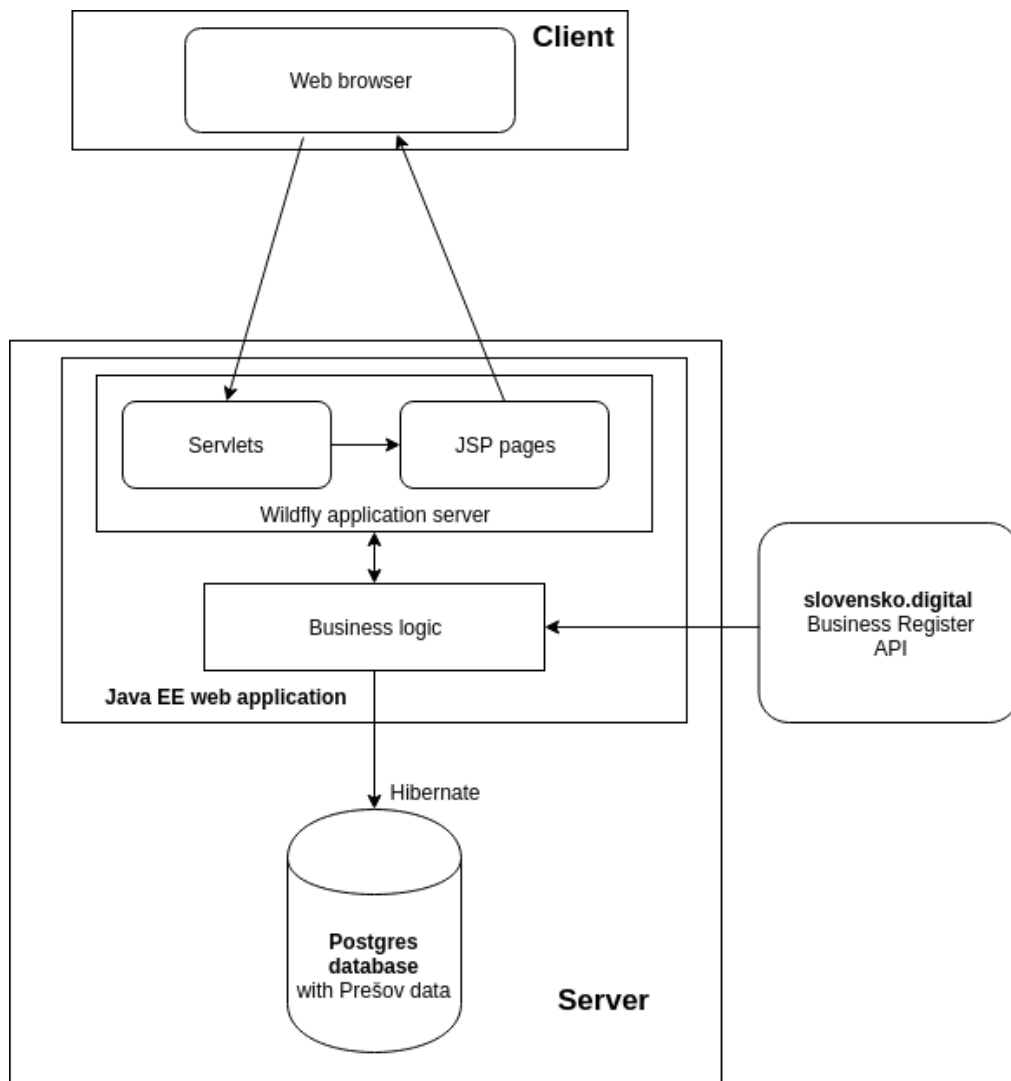


Figure 4.5: Diagram describing web application structure.

Zmluvy Dotácie Objednávky Faktúry Štatistiky O projekte				
Filter				
Názov firmy	Text predmetu	Dátum od	Dátum do	▼ 🔍
Počet záznamov: 6092				
Celková hodnota: 264 267 458,12 €				
Kontraktor	Predmet	Dátum podpisu	Cena	Ďalšia Posledná
Technické služby mesta Prešov a.s.	Mení a dopĺňa sa Čl. IV Cena diela.	03.05.2018		🔍
EUROVIA SK, a.s.	Zhotovenie stavby v rozsahu schválenej projektovej dokumentácie "Cyklocesta Mestská hala - Wilec hórka".	02.05.2018	155 784,00 €	🔍
MODULOR Bratislava, s.r.o.	Pôvodná zmluva sa mení a dopĺňa v čl. IV. a čl. VI. a čl. XI.	02.05.2018	5 544,00 €	🔍
HYDROARCH, s.r.o.	Vypracovanie a dodanie dokumentácie pre Stavebné povolenie (DSP) pre stavbu: "MŠ Mukačevská - kanalizácia, 2. etapa"	02.05.2018	2 100,00 €	🔍
Lechstav, s.r.o.	Zhotovenie stavby v rozsahu schválenej projektovej dokumentácie "MŠ Sabinovská - fasáda".	02.05.2018	179 993,59 €	🔍
STEX, spol. s r.o.	Zhotovenie stavby v rozsahu schválenej projektovej dokumentácie "ABC CVČ Októbrová - okná, dvere, zateplenie".	02.05.2018	148 576,58 €	🔍
Technické služby mesta Prešov a.s.	Zverenie majetku do správy - výbeh pre psov.	27.04.2018		🔍
Východoslovenská vodárenská spoločnosť, a.s.	Dohoda na odklade splatnosti faktúr.	10.04.2018		🔍
Dohodnutá nočná ochrana SD Orlbomá Dohodnutie dotácie na zabezpečenie MT7 udržiavania DH7Q na OÚDP na flunu DH7Q, odhromí				

Figure 4.6: Picture showing the way the web application presents contracts.

Zmluvy Dotácie Objednávky Faktúry Štatistiky O projekte	
Zmluva číslo 201800341	
Typ:	Zmluva o dielo
Druh:	na zhotovenie stavby
Strany:	Mesto Prešov, EUROVIA SK, a.s.
Predmet:	Zhotovenie stavby v rozsahu schválenej projektovej dokumentácie "Cyklocesta Mestská hala - Wilec hórka".
Suma:	155 784,00 €
Dátum podpisu:	02.05.2018
Dátum zverejnenia:	03.05.2018
Názov:	Zmluva o dielo na zhotovenie stavby: "Cyklocesta Mestská hala - Wilec hórka"
Hlavná/Dodatok:	Hlavná
Miesto (miesta) podpisu:	Prešov
Dátum platnosti:	04.05.2018

Figure 4.7: Picture showing the way the web application presents particular contract.

CONCLUSION

ZmluvyDotácieObjednávkyFaktúryŠtatistikyO projekte

Filter

Názov firmy

Text predmetu

▼

Q

Počet záznamov:834

Celková hodnota:1 582 070,22 €

Žiadateľ	Akcia	Rok dotácie	Stav vybavenia	Schválené prostriedky
urbanika, n.o.	Nočné objavovanie Prešova 2018	2018	Posudzuje sa	
Shohin Slovak Association	Bonsai Prešov Exhibition 2018	2018	Posudzuje sa	
Rómsky inštitút - Roma Institute, n.o.	Rozdielna je len farba dresu	2018	nesplňa náležitosti ustanovené VZN č.17/2015	
Občianske združenie CORTONA	Gospelový koncert	2018	Posudzuje sa	
Prešovské združenie klasickej gitary	8.ročník medzinárodného gitarového festivalu Prešovské dni klasickej gitary festivalu	2018	Posudzuje sa	
Výtvarný spolok KOPA	Medzinárodný maliarsky plenér spolku KOPA - Solivar a technické pamiatky Prešova II. ročník	2018	Posudzuje sa	
Akad. mal. Anna Gáinová	Lisievankine výtvarnenia-realizácia maľovanky	2018	nesplňa náležitosti ustanovené	

Figure 4.8: Picture showing the way the web application presents grants.

Zmluvy Dotácie Objednávky Faktúry Štatistiky O projekte				
Filter				
Názov firmy		Text predmetu	Dátum od	Dátum do
Počet záznamov: 6962 Celková hodnota: 19 479 356,77 €				
Dodávateľ	Text objednávky	Hodnota	Stav vybavenia	Dátum vystavenia
Súkromná stredná odborná škola	občerstvenie + náklady s realizovaním akcie, množ.: 300 , jedn. cena: 6,5600 EUR, spolu: 1 968,00 EUR	1 968,00 €	Nevybavená	02.05.2018
Jozef Kozma - AUTOSERVIS	prípravu vozidla pred TK - služobné motorové vozidlo Š Fabia PO 910 CY, množ.: 1 ks, jedn. cena: 130,0000 EUR, spolu: 130,00 EUR	130,00 €	Nevybavená	03.05.2018
Jozef Kozma - AUTOSERVIS	prípravu vozidla pred TK - služobné motorové vozidlo Š Fabia PO 988 CY, množ.: 1 , jedn. cena: 130,0000 EUR, spolu: 130,00 EUR	130,00 €	Nevybavená	03.05.2018
Jozef Kozma - AUTOSERVIS	prípravu vozidla pred TK - služobné motorové vozidlo Š Fabia PO 977 CY, množ.: 1 , jedn. cena: 130,0000 EUR, spolu: 130,00 EUR	130,00 €	Nevybavená	03.05.2018
Juraj Maťaš	čokoládové croissanty (pľundrové cesto), množ.: 250 ks, jedn. cena: 0,4000 EUR, spolu: 100,00 EUR,croissanty so slivkovou plnkou, množ.: 250 ks, jedn...	182,50 €	Nevybavená	02.05.2018
Juraj Maťaš	koláče, množ.: 650 ks, jedn. cena: 0,2000 EUR, spolu: 130,00 EUR,záviny, množ.: 15 ks, jedn. cena: 2,4000 EUR, spolu: 36,00 EUR	166,00 €	Nevybavená	02.05.2018
MDO BAŠTOVANKA n.f.	Vystúpenie žiakov a pedagógov ZUŠ M. Moyzeša dňa 8. júna 2018 od 15.30 h na hlavnom pódii:Cena dohodu : max. do 400 €, množ.: 1 vystúpenie, jedn. cen...	400,00 €	Nevybavená	02.05.2018
Občianske združenie	Vystúpenie hudobnej skupiny AKUSTIKA dňa 6. júna 2018 od 19.00 h na hlavnom pódii:Cena dohodu	200,00 €	Nevybavená	02.05.2018

Figure 4.9: Picture showing the way the web application presents orders.

Zmluvy
Dotácie
Objednávky
Faktúry
Štatistiky
O projekte

Objednávka číslo 201800310

Dodávateľ:
Hodnota:
Text:

Etudy Média Art, o. z.
180,00 €
Vystúpenie zábavného dua Feri a Pali dňa 6. júna 2018 od 15.30 h na hlavnom pódiu: Cena dohodu : max. do 180 €, množ.: 1
vystúpenie, jedn. cena: 180,0000 EUR, spolu: 180,00 EUR

Dátum vyhotovenia:
Dátum zverejnenia:
Dátum vystavenia:
Organizačná štruktúra úradu:
Schvaľujúci:
Funkcia schvaľujúceho:
Poznámky k zverejneniu:
Stav vybavenia:

03.05.2018
03.05.2018
02.05.2018
OŠKaCR ODBOR ŠKOLSTVA, KULTÚRY A CESTOVNÉHO RUCHU
PaedDr. Jitka Semivanová
poverená riadením odboru odboru školstva, kultúry a cestovného ruchu
-
Nevybavená

Figure 4.10: Picture showing the way the web application presents particular order.

Zmluvy
Dotácie
Objednávky
Faktúry
Štatistiky
O projekte

Filter

Názov firmy

Text predmetu

Dátum od

Dátum do

▼

Q

Počet záznamov: 28837
Celková hodnota: 110 667 869,89 €

Dodávateľ	Účel platby	Cena	Stav zaplattenia	Stav vybavenia	Dátum zverejnenia	Zmluva / Objednávka
3b, s.r.o.	-grafický návrh letáku na Objavovanie Prešova	10,80 €	nezaplatené	Vybavená	06.05.2018	201800088
ASTERA, s.r.o.	- dodávka potravín - ŠJ Mukačevská	182,82 €	nezaplatené		05.05.2018	
WASTEX Slovensko, s.r.o.	- potraviny - ŠJ Mukačevská	603,69 €	nezaplatené		05.05.2018	
ATC- JR, s.r.o.	potraviny - ŠJ Mukačevská	118,50 €	nezaplatené		05.05.2018	
Pavol Pagurko	potraviny - ŠJ Mukačevská	409,43 €	nezaplatené		05.05.2018	
Základná škola Prostějovská	-stravovanie - réžia deti MŠ	3 157,44 €	nezaplatené		05.05.2018	
Základná škola Prostějovská	-stravovanie - réžia zamestnanci MŠ	702,24 €	nezaplatené		05.05.2018	
J.V.S., s.r.o., Prešov	-za spotrebu elektriny	145,58 €	nezaplatené		05.05.2018	201500662
J.V.S., s.r.o., Prešov	-za vykonané práce: vysprávk MK 3/2018	978,26 €	nezaplatené		05.05.2018	201500662
J.V.S., s.r.o., Prešov	-za vykonané práce: dopravné značenie 3/2018	810,23 €	nezaplatené		05.05.2018	201500662
Technické služby mesta Prešov a.s.	-za zber, prepravu a odovzdanie odpadov na zneškodnenie zo smetných nádob od 01.04. do 15.04.2018	69 260,08 €	nezaplatené		05.05.2018	201800052

Figure 4.11: Picture showing the way the web application presents invoices.

CONCLUSION

Dopravný podnik mesta Prešov, akciová spoločnosť

IČO:	31718922
Adresa:	Bardejovská 7, 080 06 Ľubotice
Dátum založenia:	01.01.1996
Právna forma:	Akciová spoločnosť
Typ vlastníctva:	Vlast.územnej samosprávy
Počet zamestnancov:	250-499 zamestnancov
SK NACE:	Mest.,primest.osob.dopr.
Hlavná ekonomická činnosť:	Mestská alebo prímestská osobná pozemná doprava
Činnosť podľa ESA2010:	Mestská alebo prímestská osobná pozemná doprava
Miesto registrácie:	Okresný súd Prešov
Registračné číslo:	Sa/253/P
Viac informácií na:	finstat.sk/31718922

Zmluvy s mestom Prešov

Predmet	Dátum podpisu	Suma	
	▲▼	▲▼	
Na základe ustanovení zmluvy článku 10 Záverečné ustanovenia, bodu 10.2. je spracovaný Ročný projekt organizácie MHD na rok 2018, ktorý tvorí Prílohu ...	18.01.2018		🔍
Predmetom kúpy je: Projektová dokumentácia k rekonštrukcii sociálneho zariadenia Dopravného podniku mesta Prešov, akciová spoločnosť na ul. Zborovská ...	11.12.2017	2 304,00 €	🔍
Vyradenie a vyňatie z nájmu prebytočného a neupotrebitelného majetku.	05.10.2017		🔍

Figure 4.12: Basic information of the legal entity and Prešov's contracts it's involved with.

Predmety podnikania

Názov	Platný od	Platný do
- maloobchod a veľkoobchod v rozsahu voľných živností	29.12.2000	-
- sprostredkovanie obchodu, služieb a dopravy	29.12.2000	-
prevádzkovanie cestovnej agentúry	07.05.2002	-
vypracovanie dokumentácie a projektu jednoduchých stavieb, drobných stavieb a zmien týchto stavieb	07.05.2002	-
uskutočňovanie stavieb a ich zmien	07.05.2002	-
výkon činnosti stavbyvedúceho - pozemné stavby	07.05.2002	-
- staviteľ - vykonávanie jednoduchých stavieb a poddodávok	29.12.2000	06.05.2002
- zmenáme	29.12.2000	03.09.2007

Štatutárne orgány

Meno	Adresa	Typ	Od	Do
Katarína Miškufová	Sibírska 16, 08001, Prešov, Slovenská republika	Konateľ	01.01.2001	-
Cyril Miškuf	Sibírska 16, 08001, Prešov, Slovenská republika	Konateľ	01.01.2001	-
Cyril Miškuf	Sibírska 16, Prešov, Slovenská republika	Konateľ	29.12.2000	03.09.2007
Katarína Miškufová	Sibírska 16, Prešov, Slovenská republika	Konateľ	29.12.2000	03.09.2007

Zainteresované osoby

Meno	Adresa	Typ	Od	Do
Cyril Miškuf	Sibírska 16, 08001, Prešov, Slovenská republika	Spoločník v.o.s. / s.r.o.	04.09.2007	-

Figure 4.13: Economic activities, statutory bodies and stakeholders example.

Zmluvy Dotácie Objednávky Faktúry Štatistiky O projekte				
Top firmy	Top faktúry	Top dotácie	Top zmluvy	Top objednávky

Top 100 firiem podľa hodnoty vyplatených faktúr	
Firma	Suma
1. Technické služby mesta Prešov a.s.	24 456 618,02 €
2. IL Prešov, spol. s r.o.	7 193 417,46 €
3. J.V.S., s.r.o., Prešov	5 801 044,73 €
4. Záhradníctvo Sadex, s.r.o.	4 546 117,36 €
5. Východoslovenská vodárenská spoločnosť, a.s.	4 540 484,03 €
6. Dopravný podnik mesta Prešov a.s.	4 169 354,25 €
7. Ing. Miroslav Mulařík - MOVYROB	3 518 234,48 €
8. ZÁHRADA REAL, s.r.o.	3 085 749,32 €
9. Správa a zimná údržba prešovských ciest, s.r.o.	2 891 109,57 €
10. Doprastav a.s., závod Prešov	2 614 350,68 €
11. Edenred Slovakia, s.r.o.	2 376 618,00 €
12. O.S.V.O. comp, a.s.	2 130 229,21 €
13. Eiffage Construction Slovenská republika, s.r.o.	2 050 999,47 €

Top 100 firiem podľa počtu vyplatených faktúr	
Firma	Počet
1. Technické služby mesta Prešov a.s.	2029
2. SPRAYBYTKOMFORT a.s. Prešov	1880
3. Slovak Telekom, a.s.	1358
4. Orange Slovensko, a.s.	1093
5. INMEDIA, spol. s r.o.	988
6. Tatranská mliekareň a.s.	843
7. Slovenský plynárenský priemysel, a.s.	840
8. HOOK, s.r.o.	794
9. J.V.S., s.r.o., Prešov	590
10. Východoslovenská vodárenská spoločnosť, a.s.	547
11. MILK-AGRO, spol. s r.o.	387
12. Slovenská pošta, a.s.	373
13. Anna Lešková - Florida	363

Figure 4.14: Tab with the top companies by paid Prešov's invoices.

Zmluvy Dotácie Objednávky Faktúry Štatistiky O projekte				
Top firmy	Top faktúry	Top dotácie	Top zmluvy	Top objednávky

Top 100 faktúr podľa vyplatenej sumy				
Dodávateľ	Účel platby	Dátum zverejnenia	Zmluva / Objednávka	Cena
1. Dopravný podnik mesta Prešov a.s.	-vyúčtovanie straty za rok 2013 z výkonov vo verejnom záujme,-vyúčtovanie straty z výkonov vo verejnom záujme za rok 2013 - čiastočná úhrada,- vyúčtov...	07.03.2014		1 357 435,36 €
2. Dopravný podnik mesta Prešov a.s.	-vyúčtovanie straty z výkonov vo verejnom záujme za rok 2016,-vyúčtovanie straty z výkonov vo verejnom záujme za rok 2016	06.06.2017		987 354,26 €
3. Všeobecná úverová banka, a.s.	č. st. 836 - ZŠ Čsl. armády - celková rekonštrukcia Zmluva o dielo č. 2010/383/R/21zd. zo dňa 15.6.2010	07.08.2012		793 358,39 €
4. Všeobecná úverová banka, a.s.	č. st. 836 - ZŠ Čsl. armády - celková rekonštrukcia Zmluva o dielo č. 2010/383/R/21zd. zo dňa 15.6.2010	18.12.2012		765 977,61 €
5. Dopravný podnik mesta Prešov a.s.	-strata za rok 2012 z výkonov vo verejnom záujme-jednostranný zápočet 31.12.2013,-strata za rok 2012 z výkonov vo verejnom záujme,-strata za rok 2012...	07.03.2014		701 011,49 €
6. O.S.V.O. comp, a.s.	-práce pre stavbu Modernizácia verejného osvetlenia v meste Prešov LED technológiou	27.10.2015		676 026,00 €

Figure 4.15: Tab with the top invoices by paid amount.

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Acronyms

IT	Information Technology
XML	Extensible markup language
JSON	JavaScript Object Notation
RDF	Resource Description Framework
CSV	Comma Separated Values
PDF	Portable Document Format
LMI	Labour market information
URL	Uniform Resource Locator
Java EE	Java Platform, Enterprise Edition
JSP	JavaServer Pages
HTTP	Hypertext Transfer Protocol
UI	User Interface
EFTA	European Free Trade Association

Contents of the attached CD

	readme.txt	stručný popis obsahu CD
	exe	adresář se spustitelnou formou implementace
	src	
	impl.....	zdrojové kódy implementace
	thesis	zdrojová forma práce ve formátu L ^A T _E X
	text	text práce
	thesis.pdf	text práce ve formátu PDF
	thesis.ps	text práce ve formátu PS