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DEVELOPMENT OF AN WHEAT FARMING MANAGEMENT
INFORMATION SYSTEM

Introduction. Ukraine is one of the world's leading exporter of wheat [1]. The country's export is more than 10% of the world wheat market [2]. Agriculture holdings and farm holds are dominates in Ukraine agriculture. Agriholdings managers are forced to make a lot of decisions during the season: what kind of seeds to choose; seed time; how to tend crops; what to do in dangerous situations; etc. Subjectivity in decision-making results in loss of third part of future profit while cropping cultivation. Another third part of the profit is loss while harvesting and transportation. These losses can be reduced by using an automated control system (Hi-Tech Management).

The wide range of implementation of information technologies in the agriculture business is contributing to the organization of competitive production. It also provides an opportunity to find modern technologies and methods of their implementation. IT is contributing to the development of business plans that show production problems and methods to solve them [3].

It means, that implementation of business processes automation that takes into account business specifics and takes care of providing information to users on all production levels is an objective prerequisite for a wheat farming focused business growth.

Objective of the work – to develop an information system, for management and effective functioning of agriculture business focused on wheat farming, is based on geo maps.

System Technological Architecture. All software and services, are used in the project, are licensed under the terms of the GNU General Public License or

Open Source License. The current implementation of WFMIS uses traditional server-client architecture. Data input/output between a database and a server is provided by PostgreSQL Database Server [5]. The back-end part of WFMIS is based on NGINX HTTP Server and connects with the Django framework by WSGI protocol [6].

WFMIS web application uses a powerful python web frameworks – Django [7] and Django Rest Framework [8]. Django implements modern Model-View-Controller development architecture. This means the system is divided into three layers.

The first is a model or data layer. This layer consists of data encapsulated in class objects - models. Models contain data fields and relationships fields. Django supports “one to one”, “one to many” and “many to many” relationships. Django also supports most of the PostgreSQL data types. Models can be easily updated by adding new fields or relationships. Django converts all models and fields into PostgreSQL tables just by two simple terminal commands.

The second is the API View layer. This layer contains class objects that are registered to own URL. These objects are part of the Logic tier. They serialize data and create JSON objects that are listened to by the specific URL.

The third layer is a front-end view layer. Django is a good solution for full-stack development. WFMIS uses a combined UI template render system. First part is Jinja/Django template render. It was used to render static parts of the web page like the navigation bar, table bar, and input forms. The main part of the web app - an interactive map is rendered by JavaScript with using XML requests to system API provided by Django Rest Framework. This means that the current implementation of WFMIS uses AJAX technology for map rendering.

The interactive map is rendered into HTML5 canvas by the Google Map API that gets data in JSON from the web app’s Rest API.

SVG icons from fontawesome.com [9] and bootstrap grid were also used in UI development of the project.

There is how is the current implementation of WFMIS working now. User follows the link or confirms the form -> NGINX Server [10] sends an information about the action to Django by uWSGI -> Django listens the URL and connects by SQL requests to DB for data to render HTML/CSS code into a template and send by NGINX Server to browser -> At the same time, Rest API listens to the URL and render JSON file with farm hold fields data into specific URL -> JavaScript file listens to the URL by XML requests and redraw a map canvas according to actual data (figure 1).

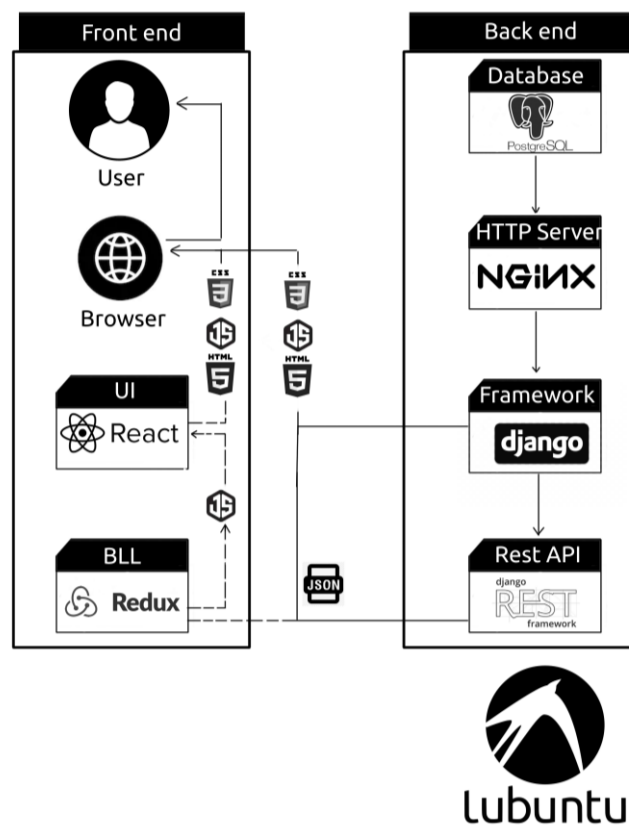


Figure 1. System technological architecture

The developed information system is adapted to meet the needs of domestic agribusiness. A common problem associated with ready-made software is that

businesses are forced to alter some of their processes to fully utilize the product. The information system is based on open-source technologies and uses modern software solutions. Farming management system, that was developed, provides smart-farming technologies, that helps to manage all levels of wheat production and rational resources distribution.

Bibliography

1. FAO Cereal Supply and Demand Brief: веб-сайт. URL: <http://www.fao.org/worldfoodsituation/csdb/en/> (дата звернення: 6.02.2019).
2. Wheat Exports by Country: веб-сайт. URL: <http://www.worldstopexports.com/wheat-exports-country/> (дата звернення: 6.02.2019).
3. Тищенко С. І. "Використання інформаційних технологій у діяльності аграрних підприємств", Вісник ХНАУ : зб. наук. пр. - Харків. Економічні науки, №3, с. 291-297, 2015.
4. About Lubuntu: веб-сайт. URL: <https://lubuntu.net/about/> (дата звернення: 20.06.2019).
5. About PostgreSQL: веб-сайт. URL: https://www.elephantsql.com/docs/faq.html#What_is_PostgreSQL (дата звернення: 6.04.2019).
6. Quickstart for Python/WSGI applications: веб-сайт. URL: <https://uwsgi-docs.readthedocs.io/en/latest/WSGIquickstart.html> (дата звернення: 14.03.2019).
7. About Django: веб-сайт. URL: <https://www.djangoproject.com/start/overview/> (дата звернення: 14.03.2019).
8. About Django REST framework: веб-сайт. URL: <https://www.django-rest-framework.org/> (дата звернення: 14.03.2019).
9. About Font Awesome: веб-сайт. URL: <https://fontawesome.com/> (дата звернення: 18.03.2019).