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DEVELOPING Q-ORCA SITE BACKEND USING VARIOUS PYTHON PROGRAMMING LANGUAGE LIBRARIES

РАЗРАБОТКА БЭКЕНДА ВЕБ-САЙТА Q-ORCA С ИСПОЛЬЗОВАНИЕМ РАЗЛИЧНЫХ БИБЛИОТЕК ЯЗЫКА ПРОГРАММИРОВАНИЯ PYTHON

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Abstract. *The aim of the article is to provide a detailed description and analysis of the libraries used in the Python programming language, where the Q-Orca backend is implemented. The content of the article is an overview, with a great deal of attention given to the classification of libraries used in the development of the Q-Orca platform backend and their purpose, as well as details of the capabilities of the standard Python libraries. Practical value. Software products written using the Python programming language libraries work in the same way, regardless of which operating system they are running on. Results. One of the attractive aspects of the Python programming language is the numerous standard libraries. Libraries of the programming language Python have many different functions, and even more in many modules and scripts available on the Internet.*

Key words: *Python, standard library, Q-Orca, backend.*

Introduction.

The current situation in sport competitions demands occurrence of one and versatile platform for competitions' data management. Wide range of sites intended to facilitate processes of contests do not meet all needs of organizers and competitors. Therefore, Q-Orca is expected to become the thing that will work it out.

A list of functions covered by the platform:

–event creating;
–adapting event to organizers;
–signed up competitors accounting;
–team creating;
–registration in Q-Orca;
–registration in events;

–team editing as a team captain;
–downloading of automatically created badges;
–downloading of events documentation;
–system administration;
–transforming users into managers to create and edit events;
–providing access to events' results on-line.

The main driving force for all of them is Python, and another thing comes in handy during a site development – Python libraries.

The purpose of article is to classify libraries used in Q-Orca backend development and to highlight their purpose and profitability, thus simplify a process of learning for persons working with Python.

The tasks are:

To classify Python libraries used in Q-Orca backend development.

To describe libraries and show some examples of their use.

A relevance of this article is that for the time being Python is the fifth most used as a professional language in Ukraine and the eighth in the list of languages a person wants to learn next according to Dou [1].

A new element is that there is no comprehensive and complex article that would cover all below-mentioned questions from different views and both for prepared and non-prepared readers.

Main part. There are roughly ten groups presented below. ***Amazon.*** In 2006, Amazon Web Services (AWS) began offering IT infrastructure services to businesses in the form of web services -- now commonly known as cloud computing. One of the key benefits of cloud computing is the opportunity to replace up-front capital infrastructure expenses with low variable costs that scale with your business. With the Cloud, businesses no longer need to plan for and procure servers and other IT infrastructure weeks or months in advance. Instead, they can instantly spin up hundreds or thousands of servers in minutes and deliver results faster [2].

Boto3 makes it easy to integrate your Python application, library, or script with AWS services including Amazon S3, Amazon EC2, Amazon DynamoDB, and more. Boto3 has two distinct levels of APIs. Client (or "low-level") APIs provide one-to-one mappings to the underlying HTTP API operations. Resource APIs hide explicit network calls but instead provide resource objects and collections to access attributes and perform actions [3].

Botocore is a low-level interface to a growing number of Amazon Web Services. Botocore serves as the foundation for the AWS-CLI command line utilities. It will also play an important role in the boto3.x project. The botocore package is compatible with Python versions 2.6.5, Python 2.7.x, and Python 3.3.x and higher [4].

S3transfer is a Python library for managing Amazon S3 transfers.

Text encoding. Chardet universal encoding detector for Python 2 and 3. Current version is a continuation of Mark Pilgrim's excellent chardet. Previously, two versions needed to be maintained: one that supported python 2.x and one that supported python 3.x. Dan Blanchard and other maintainers recently merged with Ian Cordasco's charade fork, so now we have one coherent version that works for Python 2.6+.

In Cyrillic it detects KOI8-R, MacCyrillic, IBM855, IBM866, ISO-8859-5, windows-1251 [5].

Cyrtranslit. Bi-directional Cyrillic transliteration. Transliterate Cyrillic script text to Roman alphabet text and vice versa. Transliteration is the conversion of a text from one script to another. Current version supports transliteration for Serbian, Macedonian, Montenegrin, and Russian [6].

Dates and calendars: Jdcal. This module contains functions for converting between Julian dates and calendar dates. Different regions of the world switched to Gregorian calendar from Julian calendar on different dates. Having separate functions for Julian and Gregorian calendars allow maximum flexibility in choosing the relevant calendar [7].

The *dateutil* module provides powerful extensions to the standard datetime module, available in Python. It allows computing of: relative deltas, relative deltas between two given date and/or datetime objects, dates based on very flexible recurrence rules, also parsing of RFC strings and generic parsing of dates in almost any string format are supported as well, etc [8].

Pytz brings the Olson to database into Python. This library allows accurate and cross platform timezone calculations using Python 2.4 or higher. It also solves the issue of ambiguous times at the end of daylight saving time, which you can read more about in the Python Library Reference (datetime.tzinfo). Almost all of the Olson timezones are supported [9].

Fomats and docs. JMESPath (pronounced “james path”) allows you to declaratively specify how to extract elements from a JSON document. The result of applying a JMESPath expression against a JSON document will always result in valid JSON, provided there are no errors during the evaluation process. Structured data in, structured data out [10].

Docutils is an open-source text processing system for processing plaintext documentation into useful formats, such as HTML, LaTeX, man-pages, open-document or XML. It includes reStructuredText, the easy to read, easy to use, what-you-see-is-what-you-get plaintext markup language [11].

et_xmlfile is a low memory library for creating large XML files. It is based upon the xmlfile module from lxml with the aim of allowing code to be developed that will work with both libraries. It was developed initially for the openpyxl project but is now a standalone module. The code was written by Elias Rabel as part of the Python Düsseldorf openpyxl sprint in September 2014 [12].

Openpyxl is a Python library for reading and writing Excel 2010 xlsx/xlsm/xltx/xltm files. It was born from lack of existing library to read/write natively from Python the Office Open XML format [13].

Pictures and QR: Pillow is the friendly PIL fork by Alex Clark and Contributors. PIL is the Python Imaging Library by Fredrik Lundh and Contributors [14].

PyPNG is written in Python. The most obvious “competitor” to PyPNG is PIL. Depending on what job you want to do you might also want to use Netpbm (PyPNG can convert to and from the Netpbm PNM format), or use ctypes to interface directly to a compiled version of libpng [15].

The *pyqrcode* module is a QR code generator that is simple to use and written in pure python. The module is compatible with Python 2.6, 2.7, and 3.x. The module automates most of the building process. Generally, QR codes can be created using only two lines of code. Unlike many other generators, all of the automation can be controlled manually. QR codes can be saved as SVG, EPS, PNG (by using the pypng module), and plain text. PIL is not used to render the image files. A developer can also display a QR code directly in a compatible terminal [16].

WEB. Requests is an Apache2 Licensed HTTP library, written in Python. It is designed to be used by humans to interact with the language. This means you don't have to manually add query strings to URLs, or form-encode your POST [17].

Certifi is a carefully curated collection of Root Certificates for validating the trustworthiness of SSL certificates while verifying the identity of TLS hosts. It has been extracted from the Requests project [18].

Gunicorn 'Green Unicorn' is a Python WSGI HTTP Server for UNIX. It's a pre-fork worker model. The Gunicorn server is broadly compatible with various web frameworks, simply implemented, light on server resources, and fairly speedy [19].

IDNA (Internationalized Domain Names). Support for the Internationalised Domain Names in Applications (IDNA) protocol as specified in RFC 5891. This is the latest version of the protocol and is sometimes referred to as "IDNA 2008".

This library also provides support for Unicode Technical Standard 46, Unicode IDNA Compatibility Processing.

This acts as a suitable replacement for the "encodings.idna" module that comes with the Python standard library, but only supports the old, deprecated IDNA specification (RFC 3490).

Conclusions.

The conclusion is that one of the attractive aspects of the Python programming language is a rich standard library. There are tools for working with many network protocols and Internet formats, for example, modules for writing HTTP-servers and clients, for parsing and creating e-mail messages, for working with XML, etc. A set of modules for working with the operating system allows you to write a cross - platform applications. There are modules for working with regular expressions, text encodings, multimedia formats, cryptographic protocols, archives, data serialization, support for unit testing, etc.

In this article, we made a brief description of the Python library. As you can see, the language has many different functions already in the standard library, and even more in the many modules and scripts available on the Internet.

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Аннотация. *Целью статьи является подробное описание и анализ библиотек применяемых в языке программирования Python, на котором реализован бэкэнде платформы Q-Orca. Содержание статьи представляет собой обзорный характер, при этом большое внимание уделяется классификации библиотек, используемых в разработке бэкэнда платформы Q-Orca, и их назначению, а также подробно говорится о возможностях стандартных библитек Python. Научная новизна. Программные продукты, написанные с применением библиотек языка программирования Python работают точно так же, независимости от того, на какой операционной системе работает. Результаты. Одним из привлекательных аспектов языка программирования Python является многочисленное количество стандартных библиотек. Библиотеки языка программирования Python. имеют много разных функций, и даже больше во многих модулях и сценариях, доступных в Интернете.*

Ключевые слова: *Python, стандартная библиотека, Q-Orca, бэкенд.*