QTO SYSTEM GUIDE

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1. INTRO

1.1. Purpose

The purpose of this guide is to provide description of the qto system and application architecture.

1.2. Audience

Target audience of this document is comprised of the architects and System designers of a potential or current system, comprised on deployed and operating qto instances. Developers and devops operators.

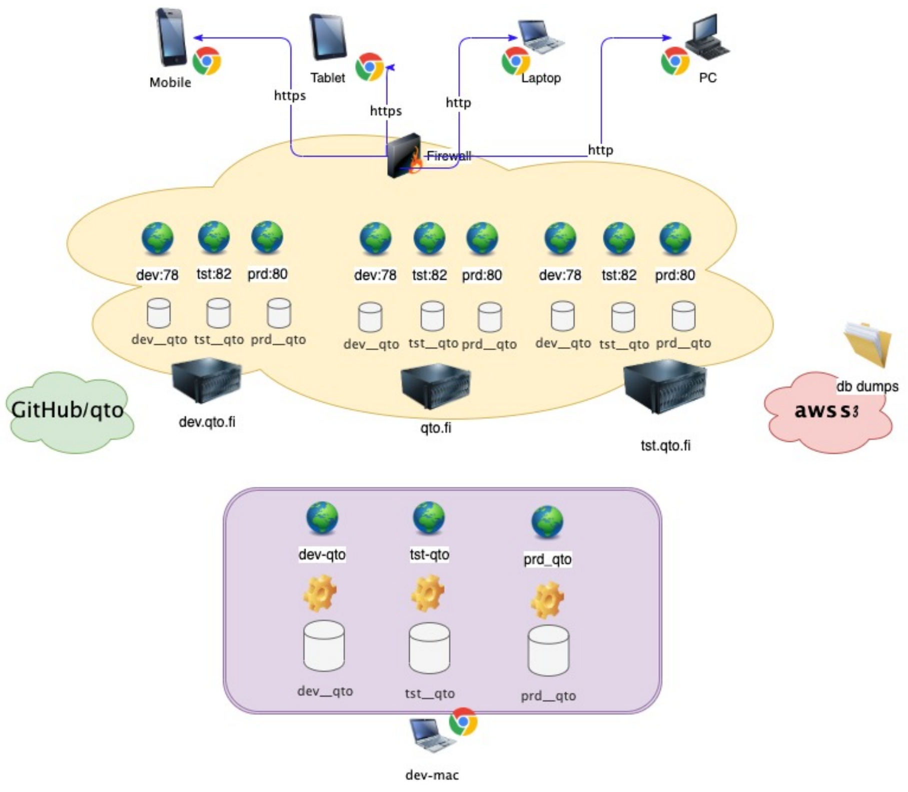
2. THE QTO SYSTEM INFRASTRUCTURE

This section describes the current system infrastructure.

2.1. System architectural overview by SIWA dia

The following diagram implements the Simplest Possible Way of describing Architecture principle - it's sole purpose is to quickly provide an overview of the existing infrastructure built with the help of the qto application as well as provide visual tool for communication related to the application.

Figure 1: The qto insfrastructure



2.2. Infrastructural components

2.2.1. End-user clients

The end-users can access any qto application via their browsers. All of the functionalities are available in mobile browsers (smart-phones or tablets not older than 2 years)

2.2.2. Application Layer and databases hosted in AWS

Both the application layer and the database(s) are hosted on the same amazon ec2 host (this will change in the future, as the architecture supports databases hosting in RDS or in separate hosts with TCP data channel)

2.2.3. Local Development and testing

The development and testing are done in an ubuntu 18.04 vm running on top of mac - the binary configuration for the vm in described in the bootstrap script.
You could also develop and test in other Unix-like OS('s) - GentOs, MacOS etc, as long as you could figure out how-to install and provision postgres , the required OS binaries and the Perl modules for the application layer, as the provided deployment script has been aimed and tested only for the latest Ubuntu LTS.

2.2.4. Source code in GitHub

The source code for the qto project is hosted in GitHub with the most open licensing possible:
https://github.com/YordanGeorgiev/qto

3. ARCHITECTURE

3.1. IOCM architecture definition

The Input-Output Control Model architecture is and application architecture providing the highest possible abstraction for almost any software artefact, by dividing its main executing components based on their abstract responsibilities - Input, Output , Control and Model.

3.1.1. The Control components

The Control components control the control flow in the application. The instantiate the Models and pass them to the Readers , Converters and Writers for output.

3.1.2. The Model components

The model components model the DATA of the application - that is no configuration, nor control flow nor anything else should be contained wihin the model.
Should you encounter data, which is not modelled yet , you should expand the Model and NOT provide different data storage and passing techniques elsewhere in the code base ...

3.1.3. The Input Components

The Input Components are generally named as "Readers". Their responsibility is to read the application data into Model(s).

3.1.4. The Output Components

The Output Components are generally named as "Writers" Their responsibility is to write the already processed data from the Models into the output media .

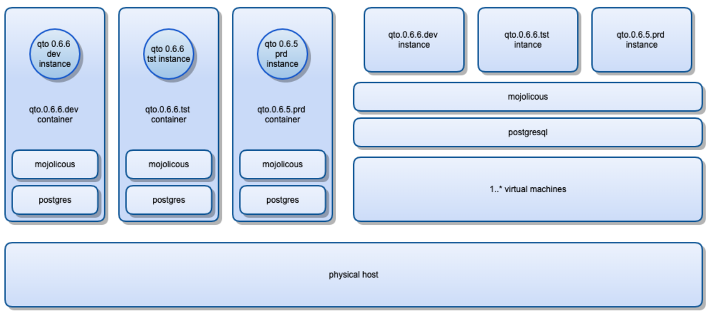
3.1.5. The Converter Components

The Converters apply usually the business logic for converting the input data from the Models into the app specific data back to the Models.

3.2. Multi-instance setup

The multi-instance setup refers to the capability of any installed and setup instance of the qto application to "know" its version , environment type - development , testing and production) and owner.

Figure: 2 qto multi-instance setup



3.2.1. Multi-environment naming convention

Each database used by the qto application has an <<environment abbreviation>> suffix referring to its environment type. Running application layers against different db versions should be supported as much as possible.

3.3. Sofware architecture

3.3.1. Front-End

The Mojolicious Web Framework runs on top of a perl instance, which serves the back-end requests and passes back and forth json, as well as the ui Mojo templates dynamically, which combined with the vue template create the generic ui.

3.3.2. Back-End

The id's of the tables which ARE VISIBLE to the end users ui are big integers, which are formed by the concatenation of the year, month, day, hour, minutes and second in which the row in the table is created.

4. APPLICATION CONTROL FLOW

This section provides a generic control flow description for the shell based and ui based control flows.

4.1. Shell control flow

The shell control flow is based on the control model input output architecture. The usual pattern is to call a single <<doSomeAction>> shell function, which is stored in a some-action.func.sh file and loaded dynamically based on this naming convention. Maximun of 2 level nesting is used in the functional calls, that is once an shell action is evoked it could call only 1 funtion, which might or might be not a shell action function , BUT not more, to address unneeded complexity written in bash.

4.1.1. Front-End

The Mojolicious Web Framework runs on top of a perl instance, which serves the back-end requests and passes back and forth json, as well as the ui Mojo templates dynamically, which combined with the vue template create the generic ui loaded in modern html 5, web sockets and ajax capable browsers.
That said the html,js , vue code is mixed with some perl Mojolicious template code several times per file unit and the logic of building the file units into html pages in defined by the Mojolicious templating system, but once one could grasp the concept the developing of the front-end is more or less html,javascript , vue centric.

4.1.2. Back-End

The id's of the tables which ARE VISIBLE to the end users ui are big integers, which are formed by the concatenation of the year, month, day, hour, minutes and second in which the row in the table is created.
The primary keys are however GUID's to provide the underlying expandability for cross-domain, cross-db data transfers.

5. SECURITY

This section provides an overview of the security of a system operating the qto application.

5.1. Non-security mode

In the non-security mode the application does NOT authenticate any one. Both run over https and http. Of course if you use http all the traffic will be in plain text ...

5.2. Simple native security mode

In this mode the authentication is performed against the project defined in the login page (where project is actually the database to which the application layer can connect to). This means that one user can have access to multiple project databases and be authenticated agains some of them thus being able to navigate with the same browser from project to project. In this mode the user credentials - email and password are stored in the users table with a blowfish encryption.
Sessions are used for storing the state of the authentication, which is handled by the Mojolicious web framework - all data gets serialized to json and stored Base64 encoded on the client-side, but is protected from unwanted changes with a HMAC-SHA1 signature.