AQUA Private Registry Cloud
Technical Overview
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1. Summary

The Private Registry Cloud option is designed for healthcare providers in larger academic and health system environments who wish to participate in the AQUA registry, but do not want to release identified data outside of their networks. This option allows these participant organizations to contribute de-identified aggregate data to the registry while retaining full control of data confidentiality within their organization’s network.

This is achieved by creating a smaller “private cloud” replica of the registry inside the participant organization’s network. The clinical data collected from internal data sources are retained within the private registry cloud providing a full feature set to users, including clinical quality measure (CQM) feedback and comparison benchmarks, while still contributing de-identified data to the registry to help improve the quality of your specialty by adding to the national registry database.

FIGMD is a technology partner of the AUA, providing the registry platform for the AQUA Registry.
2. Technical Overview

Registry Cloud *(external)*

- Benchmark Data Mart
- Quality Measure Engine
- Clinical Data Repository

Participant Network *(internal)*

- Private Cloud
  - Registry Dashboard
  - Quality Data Mart
  - Analytics Data Mart
  - Quality Measure Engine
  - Crosswalk engine
  - Clinical Data Repository
  - Registry Practice Connector

Network Nodes:
- EMR/EHR
- LAB IS
- PM/Billing
- PACS
- HIT Infrastructure

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3. Technical Specifications

The AQUA Private Registry Cloud operates on a minimum of two virtual machines (VM). The VMs should have the following configuration.

*Note: The configuration specs may be reduced depending upon number of providers participating in the registry.*

<table>
<thead>
<tr>
<th>Server</th>
<th>Configuration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM01</td>
<td>2.4 Ghz x 2 (4 cores each) &lt;br&gt; 64 GB RAM &lt;br&gt; 2 TB Storage &lt;br&gt; Microsoft Windows Server 2012 R2 Standard Edition &lt;br&gt; Microsoft SQL Server 2012 Standard Edition</td>
<td>Recommended that this server become a part of the onsite AD Domain in order to bring it under on premises update management and security protocols</td>
</tr>
<tr>
<td>VM02</td>
<td>2.4 Ghz x 2 (4 cores each) &lt;br&gt; 32 GB RAM &lt;br&gt; 2 TB Storage &lt;br&gt; CentOS 7</td>
<td>This server will be kept updated by FIGMD independently</td>
</tr>
</tbody>
</table>

FIGMD provides preconfigured VMs as VMware OVA templates. The participant shall be responsible for infrastructure licensing (i.e. for Windows Server, SQL Server, VMware, etc.)

A. VM01 Stack Details

VM01 is the windows server within the Private Cloud. This server hosts the following services:

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registry Dashboard</td>
<td>IIS hosted application written in C# ASP.net. Leverages the latest in web technologies to deliver a cutting edge user experience. Users are able to access performance metrics, benchmarks, analytics etc. via the dashboard</td>
</tr>
<tr>
<td>Quality Data Mart</td>
<td>Implemented using Microsoft SQL Server RDBMS as well as SSIS. Stores toe aggregate and calculated performance measure data</td>
</tr>
<tr>
<td>Analytics Data Mart</td>
<td>Implemented using SSAS, implements OLAP Cubes which enable dynamic analysis of the clinical data</td>
</tr>
<tr>
<td><strong>Quality Measure Engine</strong></td>
<td>Implemented using a combination of C# and SSIS, performance measure calculations and populates the Quality Data Mart</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Cross Walk Engine</strong></td>
<td>Implemented using C# and a component of the FIGMD Windows Service installed on this server, performs code cross walks and translations</td>
</tr>
<tr>
<td><strong>Clinical Data Repository</strong></td>
<td>Implemented using Microsoft SQL Server RDBMS, stores the discrete clinical data that has been collated from various health IT systems within UAB</td>
</tr>
<tr>
<td><strong>Registry Practice Connector</strong></td>
<td>Implemented using C# and a component of the FIGMD Windows Service, the RPC connects to various data sources within the UAB network via Direct TCP channels, Web Services, SFTP, ODBC etc. This component is the primary component that collates data from within the Health IT infrastructure in its original format and stores it in the Clinical Data Repository</td>
</tr>
</tbody>
</table>

**B. VM02 Stack Details**

VM01 is the Linux server within the Private Cloud. This server hosts the following services:

| **Apache Tomcat Web Application Server** | Hosts the web app for modules including audit logging, patient report outcomes, and form builder |
| **Elastic Map Reduce and Log stash**     | Serves as the backbone for the audit logging functionality for the Private Cloud |
| **Form Builder**                         | A robust module which enables the authoring of custom forms for the purposes of on demand EDC (Electronic Data Capture) |
C. Bi-Directional Access

The following diagram describes the directionality and method of communications that are used to manage and operate the registry private cloud.