Software Design Document
for
Auditor-Controller
Version 2.0 approved
Prepared by
Jasmine Cao, Jiabao Shan, Kristen Marenco, Kaylee Alfaro
March 20, 2019
# Table of Contents

1. Introduction..................................................................................................................... 6
   1.1. Purpose..................................................................................................................... 6
   1.2. Document Conventions............................................................................................ 6
   1.3. Intended Audience and Reading Suggestions......................................................... 6
   1.4. System Overview..................................................................................................... 6
2. Design Considerations........................................................................................................ 7
   2.1. Assumptions and Dependencies.............................................................................. 7
   2.2. General Constraints............................................................................................... 7
   2.3. Goals and Guidelines............................................................................................. 7
   2.4. Development Methods........................................................................................... 7
3. Architectural Strategies.................................................................................................... 7
4. System Architecture.......................................................................................................... 7
5. Policies and Tactics.......................................................................................................... 9
   5.1. Specific Products Used........................................................................................... 9
   5.2. Plans for ensuring requirements traceability.......................................................... 9
   5.3. Plans for testing the software.................................................................................. 9
   5.4. How to build and/or generate the system’s deliverables....................................... 9
6. Detailed System Design.................................................................................................. 9
   6.1 Contracts Expiring in 30, 60, 90 Days....................................................................... 9
      6.1.1 Responsibilities.................................................................................................. 9
      6.1.2 Constraints........................................................................................................ 9
      6.1.3 Composition....................................................................................................... 9
      6.1.4 Uses/Interactions............................................................................................... 9
      6.1.5 Resources.......................................................................................................... 10
      6.1.6 Interface/Exports.............................................................................................. 10
   6.2 30 Days..................................................................................................................... 10
      6.2.1 Responsibilities.................................................................................................. 10
      6.2.2 Constraints........................................................................................................ 10
      6.2.3 Composition....................................................................................................... 10
      6.2.4 Uses/Interactions............................................................................................... 10
      6.2.5 Resources.......................................................................................................... 11
      6.2.6 Interface/Exports.............................................................................................. 11
   6.3 60 Days..................................................................................................................... 11
      6.3.1 Responsibilities.................................................................................................. 11
      6.3.2 Constraints........................................................................................................ 11
      6.3.3 Composition....................................................................................................... 11
      6.3.4 Uses/Interactions............................................................................................... 11
      6.3.5 Resources.......................................................................................................... 12
      6.3.6 Interface/Exports.............................................................................................. 12
   6.4 90 Days..................................................................................................................... 12
      6.4.1 Responsibilities.................................................................................................. 12
      6.4.2 Constraints........................................................................................................ 12
# Revision History

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
<th>Reason For Changes</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Draft</td>
<td>2018-12-1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Final Draft</td>
<td>2019-3-20</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Purpose

The purpose of this document is to describe the design of the dashboard. The financial dashboard is comprised of data gathered from LA County contracts intended for LA County executives enterprise wide in efforts to display contract data per requirements.

1.2 Document Conventions

ATM - Azure Traffic Manager
CD - Code
CDN - Content Delivery Network
DNS - Domain Name System
KPI - Key Performance Indicator
LA - Los Angeles
RPT - Report
WFE - Web Front End

1.3 Intended Audience and Reading Suggestions

The intended audiences would be customer representatives, developers, and acceptance testers.

1.4 System Overview

The product will be a dashboard based on LA County’s contract data. The product is tailored to giving a simple and quick visual to the intended users. Future versions of this product may be implemented into LA County’s database to coincide with two other dashboards LA County is producing internally.
2. Design Considerations

2.1 Assumptions and Dependencies

This product depends on the County’s ability to input clean data to the dashboard. This product is constrained by not having access to the County database.

2.2 General Constraints

The dashboards will be built using Power BI. This version of the dashboards will not be required to connect to a database. However, the developers must keep in mind during development that future versions will be connected to a database.

2.3 Goals and Guidelines

Current goals are to display contract status.

2.4 Development Methods

Hybrid Waterfall and Agile approach.

3. Architectural Strategies

The architecture of Power BI is the architecture of our product. The main strategy is reuse of Power BI to create reports and visualization on the dataset, including mechanisms such as drill down, drill through, filter, etc.

4. System Architecture

Each Power BI deployment consists of two clusters – a Web Front End (WFE) cluster, and a Back-End cluster.

The WFE cluster manages the initial connection and authentication process for Power BI, using AAD to authenticate clients and provide tokens for subsequent client connections to the Power BI service. Power BI also uses the Azure Traffic Manager (ATM) to direct user traffic to the
nearest datacenter, determined by the DNS record of the client attempting to connect, for the authentication process and to download static content and files. Power BI uses the Azure Content Delivery Network (CDN) to efficiently distribute the necessary static content and files to users based on geographical locale.

The Back-End cluster is how authenticated clients interact with the Power BI service. The Back-End cluster manages visualizations, user dashboards, datasets, reports, data storage, data connections, data refresh, and other aspects of interacting with the Power BI service. The Gateway Role acts as a gateway between user requests and the Power BI service. Users do not interact directly with any roles other than the Gateway Role. Azure API Management will eventually handle the Gateway Role.

**Contract Monitoring**

As of February 27, 2019

<table>
<thead>
<tr>
<th>DFI, NA</th>
<th>RPT_CD</th>
<th>RPT_NM</th>
<th>STRT_DT</th>
<th>END_DT</th>
<th>CURR_EXP</th>
<th>ACTUAL эксп</th>
<th>Over</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treasurer &amp; Tre-Collector</td>
<td>74307</td>
<td>Automated Coaching System</td>
<td>Tuesday, June 10, 2019</td>
<td>Thursday, January 31, 2019</td>
<td>1,444,440</td>
<td>899,586.66</td>
<td>55.00%</td>
<td>2</td>
</tr>
<tr>
<td>Treasurer &amp; Tre-Collector</td>
<td>75863</td>
<td>Akita Finance Systems, Inc</td>
<td>Thursday, February 1, 2017</td>
<td>Thursday, January 31, 2019</td>
<td>1,616,205</td>
<td>1,325,955.30</td>
<td>73.39%</td>
<td>2</td>
</tr>
<tr>
<td>Treasurer &amp; Tre-Collector</td>
<td>75870</td>
<td>CPM Corporation</td>
<td>Tuesday, April 1, 2017</td>
<td>Thursday, January 31, 2019</td>
<td>1,204,240</td>
<td>685,513.39</td>
<td>64.99%</td>
<td>2</td>
</tr>
<tr>
<td>MetroCare Networks</td>
<td>12937481</td>
<td>PRINCESS MARY MEDICAL CARE/MDG CARDIOVASCULAR RESOURCES, INC</td>
<td>Wednesday, January 28, 2009</td>
<td>Thursday, January 31, 2019</td>
<td>8,207,000</td>
<td>10,827,937.94</td>
<td>105.15%</td>
<td>3</td>
</tr>
<tr>
<td>Public Works Department</td>
<td>79053</td>
<td>EMERALD CREST</td>
<td>Sunday, February 1, 2009</td>
<td>Thursday, January 31, 2019</td>
<td>64,086</td>
<td>42,104.82</td>
<td>78.65%</td>
<td>2</td>
</tr>
<tr>
<td>Public Works Department</td>
<td>76022</td>
<td>NORTH-CHER COUNTY ZONES</td>
<td>Tuesday, February 1, 2009</td>
<td>Thursday, January 31, 2019</td>
<td>23,500</td>
<td>19,303.00</td>
<td>82.08%</td>
<td>2</td>
</tr>
<tr>
<td>Ambulatory Care Networks</td>
<td>12937481</td>
<td>Ortho Engineering</td>
<td>Sunday, December 15, 2008</td>
<td>Thursday, January 31, 2019</td>
<td>32,043</td>
<td>28,650.30</td>
<td>89.19%</td>
<td>2</td>
</tr>
<tr>
<td>Ambulatory Care Networks</td>
<td>12937481</td>
<td>Ortho Engineering</td>
<td>Sunday, December 15, 2008</td>
<td>Thursday, January 31, 2019</td>
<td>32,043</td>
<td>28,650.30</td>
<td>89.19%</td>
<td>2</td>
</tr>
<tr>
<td>LSC+UCI HealthCare Network</td>
<td>7003891</td>
<td>Ortho Engineering Co</td>
<td>Sunday, March 1, 2009</td>
<td>Thursday, January 31, 2019</td>
<td>1,746,240</td>
<td>1,103,273.64</td>
<td>61.24%</td>
<td>2</td>
</tr>
<tr>
<td>LSC+UCI HealthCare Network</td>
<td>7003891</td>
<td>Ortho Engineering Co</td>
<td>Sunday, March 1, 2009</td>
<td>Thursday, January 31, 2019</td>
<td>1,746,240</td>
<td>1,103,273.64</td>
<td>61.24%</td>
<td>2</td>
</tr>
</tbody>
</table>

**DFD:**
5. Policies and Tactics

5.1 Choice of which specific products used
Microsoft Power BI

5.2 Plans for ensuring requirements traceability
This is a hybrid Waterfall and Agile approach so, to ensure requirements traceability, the LA County executives must approve each iteration of the product.

5.3 Plans for testing the software
To have the users-executives read and gather information from the dashboards.

5.4 How to build and/or generate the system’s deliverables (how to compile, link, load, etc.)
To load new flat files:
Open Power BI > Home > Get Data > Text/CSV
To link new tables:
Open Power BI > Home > Manage Relationships > New

6. Detailed System Design

6.1 Contracts Expiring in 30, 60, 90 Days

6.1.1 Responsibilities
This component displays the count of contracts expiring in 30, 60, and 90 days.

6.1.2 Constraints
There is no drill down feature for this chart.

6.1.3 Composition
Composed of a ‘Donut Chart’ visualization with the ‘Days Until Expiration’ column in the Legend. The ‘EXPIRE IN 30DAYS’, ‘EXPIRE IN 60DAYS’, ‘EXPIRE IN 90 DAYS’ columns in the Values.

6.1.4 Uses/Interactions
The main use of this component is to allow the user to view the data per the requirements.

6.1.5 Resources
Not applicable

6.1.6 Interface/Exports
This component may be exported to Microsoft Excel.

6.2 30 Days

6.2.1 Responsibilities
This component must display the amount of contracts ending in 30 days and which budget threshold the contracts fall into.

6.2.2 Constraints
No drill down feature.

6.2.3 Composition
Comprised of a ‘Bar Graph’ with ‘Budget Thresholds’ column in the Axis and ‘EXPIRE IN 30 DAYS’ column in the Values.

6.2.4 Uses/Interaction
The main use of this component is to inform the user of how many contracts are expiring in 30 days and their corresponding budget thresholds.

6.2.5 Resources
This component affects all other components by filtering.

6.2.6 Interface/Exports
This component may be exported to Microsoft Excel.

6.3 60 Days

6.3.1 Responsibilities
This component must display the amount of contracts ending in 30 days and which budget threshold the contracts fall into.

6.3.2 Constraints
Not applicable

6.3.3 Composition
Comprised of a ‘Bar Graph’ with ‘Budget Thresholds’ column in the Axis and ‘EXPIRE IN 60 DAYS’ column in the Values.

6.3.4 Uses/Interaction
The main use of this component is to inform the user of how many contracts are expiring in 60 days and their corresponding budget thresholds.

6.3.5 Resources
This component affects all other components by filtering.

6.3.6 Interface/Exports
This component may be exported to Microsoft Excel.

6.4 90 Days

6.4.1 Responsibilities
This component must display the amount of contracts ending in 30 days and which budget threshold the contracts fall into.

6.4.2 Constraints
No drill down feature.

6.4.3 Composition
Comprised of a ‘Bar Graph’ with ‘Budget Thresholds’ column in the Axis and ‘EXPIRE IN 90 DAYS’ column in the Values.

6.4.4 Uses/Interaction
The main use of this component is to inform the user of how many contracts are expiring in 90 days and their corresponding budget thresholds.

6.4.5 Resources

This component affects all other components by filtering.

6.4.6 Interface/Exports

This component may be exported to Microsoft Excel.

6.5 Contract Status Table

6.5.1 Responsibilities

This component must display the contracts being filtered by the other visualizations in the dashboard.

6.5.2 Constraints

No drill down feature. Will not work if it is not connected to another component via the entity relationship diagram.

6.5.3 Composition

Comprised of a ‘Table’ visualization with its Values:

- ‘Department’
- ‘Reporting Code’
- ‘Reporting Name’
- ‘Start Date’
The main use of this component is to filter other components.

### 6.5.5 Resources

This component affects all other components by filtering.

### 6.5.6 Interface/Exports

This component may be exported to Microsoft Excel.
7. Detailed Lower level Component Design

Not applicable.
8. Data Source

The table holds the following columns:

- Department
- Department Name
- Report Code
- Report Name
- Start Date
- End Date
- Contract Budget
- Expenditure
- Expended Percentage
- Days Til Expiration
9. User Interface

9.1 Overview of User Interface

The user class of our project are the executives. From our dashboards, the users are able to gather information such as expenditure and budget amount, vender information, remaining budget and total budget amount for each department, and visually viewing the comparisons among different departments.

9.2 Screen Frameworks or Images
9.3 User Interface Flow Model

10. Requirements Validation and Verification

<table>
<thead>
<tr>
<th>Functional Requirements</th>
<th>Component/Module</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1 Contracts Expiring in 30, 60, 90 Days</td>
<td></td>
<td>Manual Testing</td>
</tr>
<tr>
<td>4.1.1.1 The system shall display Days Until Expiration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.1.2 The system shall display EXPIRE IN 30 DAYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.1.3 The system shall display EXPIRE IN 60 DAYS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.1.4 The system shall display EXPIRE IN 90 DAYS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.1.5 The system shall utilize the Donut Chart visualization.</td>
<td>6.1 Contracts Expiring in 30, 60, 90 Days</td>
<td></td>
</tr>
<tr>
<td>4.1.2 30 Days</td>
<td>6.2 30 Days</td>
<td>Manual Testing</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td>4.1.2.1 The system shall display EXPIRE IN 30 DAYS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.2.2 The system shall display Budget Thresholds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.2.3 The system shall utilize the Bar Graph visualization.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.1.3 60 Days</th>
<th>6.3 60 Days</th>
<th>Manual Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.3.1 The system shall display EXPIRE IN 60 DAYS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.3.2 The system shall display Budget Thresholds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.3.3 The system shall utilize the Bar Graph visualization.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.1.4 90 Days</th>
<th>6.4 90 Days</th>
<th>Manual Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.4.1 The system shall display EXPIRE IN 90 DAYS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.4.2 The system shall display Budget Thresholds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.4.3 The system shall utilize the Bar Graph visualization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.1.5 Contract Status Table</th>
<th>6.5 Contract Status Table</th>
<th>Manual Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.5.1 The system shall display Department.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.2 The system shall display Reporting Code.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.3 The system shall display Reporting Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.4 The system shall display Start Date.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.5 The system shall display End Date.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.6 The system shall display Budget.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.5.7 The system shall display Encumbrance.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.1.5.8 The system shall display Expenditure.
4.1.5.9 The system shall display Expended Percentage.
4.1.5.10 The system shall display Days Until Expiration.
4.1.5.11 The system shall utilize the Table visualization.

11. Glossary

Not Applicable

12. References

- SRS Document
  [https://csns.calstatela.edu/department/cs/project/resource/view?projectId=6628828&resourceId=6885348](https://csns.calstatela.edu/department/cs/project/resource/view?projectId=6628828&resourceId=6885348)
- Brad Appleton <brad@bradapp.net> [http://www.bradapp.net](http://www.bradapp.net)
  [https://www.cs.purdue.edu/homes/cs307/ExampleDocs/DesignTemplate_Fall08.doc](https://www.cs.purdue.edu/homes/cs307/ExampleDocs/DesignTemplate_Fall08.doc)