**[[1]](#footnote-1)**

**Customer Relations Management System Design Proposal**

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| ProManagement |
| Flownamics |
| CRM System |

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| Henry Trieu  11/15/2021  Version 1.0.0 |

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# Introduction

ProManagement is proposing Flownamics as a Customer Relationship Management system to the American Video Game Company and you will find the detailed discussion, including requirements, methodologies, design, and testing in the sections that follow.

# A.1. Purpose Statement

The purpose of this document is to provide a scalable and intuitive CRM solution for the American Video Game Company.

# A.2. Overview of the Problem

With Sales being up by 42% in the past two years, AVGC has been unable to keep up with customer demand and growth due to an inflexible system. As the customer base continues to expand on the platform, this will cause a bottleneck of degrading system performance and ultimately affect service level objectives such as uptime or response time.

The current system is not compatible with the most commonly used browsers at their latest versions. With employees being required to utilize outdated browsers to access the current system, this creates a security vulnerability not only to the system but also to the AVGC employees.

The current system does not have a standard format and process for storing records associated with businesses, contacts, and activities which causes inaccuracy when performing forecasting. This is causing challenges in managing revenue expectations of the company, predicting profitability, and resource allocation within AVGC.

Reporting within the current system is very limited to a set of predefined report functions and does not allow custom reporting and filtering/formatting of the queried data. Not being able to perform customized reporting consequently limits forecasting and competitive market analysis for AVGC.

The current system does not maintain versions of records with auditing, workflows, and rollback which prevent AVGC from detecting catastrophic changes on the system and performing disaster recovery. Not taking the preventative measures and being capable of performing necessary rollbacks to previous states puts AVGC at major risk for data loss, data corruption, and system reliability.

# A.3. Goals and Objectives

Goals and Objectives of the CRM Solution:

Flexible and Scalable System

Intuitive and User-Friendly Interface

Historical Data and Activity Management

Powerful Reporting Capabilities

# A.4. Prerequisites

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Prerequisite | Description | Completion Date |
| 1 | Collect Data | Collect all existing information related to Data Types that will be imported into the new CRM system as part of the transition process. | 5/12/22 |
| 2 | Current Live Monitoring Examination | Examine the current metrics being live monitored which will be implemented into live-updating dashboards within the new CRM system. | 6/12/22 |
| 3 | Gather Common Workflows | Gather the commonly used workflows being used across different tools from the AVG employees that will be consolidated into workflows in the new CRM system. | 6/19/22 |

# A.5. Scope

**These items are within scope:**

* Supporting 500 users concurrently on the platform and being able to automatically scale as customer demand grows.
* Support accessing the CRM system using these browsers: Chrome, Firefox, Edge, and Safari.
* Manage data through respective data types and store related information via attributes.
* Generate on-demand reports via predefined and custom dashboards and display them on a user interface that allows filtering, formatting, and querying the exported data.
* Auditing user and system activity related to automated/manual processes and changes made to any records stored on the system.

**These items are out of scope:**

* Active Directory implementation will be addressed in a future version.
* Multi-Factor Authentication implementation will be supported with mobile apps in a future version (Microsoft Authenticator, Google Authenticator, Authy, etc.).
* Our company will not develop custom workflows for each Data Type at this time.
* Sharing “Saved Views” within the Report Generation from user to user on the platform will be addressed in a future version.

# A.6. Environment

The system will be compatible with the below list of storage, operating systems, browsers:

* Amazon Web Services
* Azure
* SQL Server 2021
* Latest Chrome and Chromium
* Latest Firefox
* Latest Edge
* Safari 6.0
* Mobile & Tablet
* iOS7 Safari

# Requirements

* The system will be able to support 500 concurrent users accessing the system and be scalable with a growing user base.
* The system will be compatible with the latest version of these browsers: Chrome, Firefox, Edge, and Safari.
* The system will manage information through respective data types and their related attributes for intuitive record viewing.
* The system will be able to generate on-demand reports via predefined and custom dashboards and display them on a user interface that allows filtering and formatting of the queried data.
* User activity and system activity from automated/manual processes will be audited and stored.

# Business Requirements

User activity and system activity from automated/manual processes will be audited and stored for tracking purposes. When any action is performed within the system, the action performed, the entity that performed the action (user/system), and the timestamp are recorded within the “Audit History” tab of the associated data type. For example, if a user updates the phone number of a Contact within the system, this action will appear within the Audit History tab of the Contact containing the user that performed the action, the old and previous values of the phone number, and the timestamp of when the change was made.

# User Requirements

The system will be able to support 500 concurrent users accessing the system and be scalable with a growing user base. A stress test will be performed to confirm that 500 users will be able to be supported at launch without any performance degradation. The number of concurrent users is monitored and the system has threshold conditions to increase resources and define a new threshold when the threshold of concurrent users is met. As an example for scalability, when 500 users are concurrently connected to the system, additional system resources are provided to allow for 600 users to concurrently utilize the system and a new threshold for increasing resources is set to trigger when 600 users are concurrently connected to the system.

The system will be compatible with the latest version of these browsers: Chrome, Firefox, Edge, and Safari. The testing stage of the CRM system has been performed on the latest versions of Chrome, Firefox, Edge, and Safari. When accessing the system, the webpage will perform a check to confirm if the user is utilizing a supported browser and the latest version of the browser. If the webpage detects an unsupported browser, the user will be redirected to a page containing information and links to supported browsers.

Information is stored in attributes that exist under the respective data type for intuitive record viewing. Data Types within the system will contain a specific set of related attributes that are related to the Data Type in question. When viewing a Contact within the system, for example, the record would contain fields for the contact’s Full Name, Email-Address, Phone Number, and Business. If the value provided in an attribute field is associated with a Data Type in the system (a value in the ***Business*** field of a Contact for example), then clicking on the value will redirect to viewing the associated Data Type (in this case, redirect to the specific Business record within the CRM system).

# Functional Requirements

The system will be able to generate on-demand reports via predefined and custom dashboards and display the information on a user interface that allows filtering and formatting of the queried data. For each data type (Contact, Business, Contract, Activity for example), reports can be generated on-demand based on conditions defined within the data type’s attributes. For example, a user can perform a query for all Contacts within the system that belongs to a business called “Blockbuster” by customizing a report to return “Contacts” where the compared attribute is “Business” and the condition is “Equals” and the value in the conditional operator is “Blockbuster” for example.

# Software Development Methodology

# Advantages of the Waterfall method

* Having a detailed design of each requirement will result in less time wasted when making decisions because it is as simple as following the laid-out plan.
* If all the requirements and designs are complete, then it would consider more edge-case scenarios during the early stages instead of finding and fixing them at later stages of development.
* Since the waterfall method requires all the requirements to be fully defined into high- and low-level designs before development, this also provides an easier way to develop training material/internal documentation for the AVG employees to understand how certain features work.

# Disadvantages of the Waterfall method

* The waterfall method is inflexible by having all the requirements and design fully completed before development. If there is a better way to implement complicated features (report generation and report display for example), using the waterfall method would not allow the project to take advantage of the better design.
* The waterfall method requires everything to be defined up-front before development starts which means that portions of the team can be under-utilized while the requirements and design structure are being defined.
* With a predictive model such as the waterfall method, the initial release of the software will be delayed in comparison to an adaptive model. This poses some risk because the CRM system may not be designed entirely to AVG’s expectations during development, and they don’t get to see the product until it is released.

# Advantages of the Agile method

* Prototypes of the system and key functionalities such as the CRM navigation experience can be initially created with low fidelity to provide as an example demonstration to AVG to confirm if their vision is aligned with the developers.
* Creating prototypes allows the developers to explore and test out different approaches and decide on what is the best approach for the final product. This would allow for less wasted time when pivoting towards different design approaches for the graphic user interfaces when trying to align and satisfy the customer.
* Since prototypes allow the customers to see what the finished application will look like, it also provides the opportunity for feedback from the AVG employees which results in better requirements and design. In addition, this also would create a more useful application in the end to the end-users since they can spot problems and request changes earlier that best suit their workflows and operations.

# Disadvantages of the Agile method

* It would be challenging to deliver the project on a set timeline due to the lack of predictability surrounding cost, time, and resources to achieve rapidly changing requirements.
* Cohesive collaboration amongst team members would be challenging due to fragmented fast-paced product development which would result in inconsistent end-user experience. Navigation of the CRM system would be hindered by inconsistent approaches of design during the development stage and implementations of pages in the CRM system. End-users may complain why certain pages are more intuitive than others when navigating through the system and not all pages may provide the same ‘flow’.
* With the potential of rapidly changing requirements, the scope of the project can be taken easily off track if the expectation and requirements are not clear enough even after change requests are made. If unrealistic expectations are set as requirements of the project, the project can be derailed and delivered in an untimely manner.

# Best Suited

The Agile method is best suited for this project because of the massive benefit it provides in being able to constantly refine the design to best answer AVG’s requirements. By exploring different approaches and utilizing feedback from AVG, it would allow the CRM system to be delivered in the most beneficial way to AVG’s users. This also means adoption and transition into the system will become more seamless and less foreign when the system is implemented. With a project as large and complex, the Agile method could also be more time efficient in comparison to a predictive model such as the waterfall method.

With countless potential approaches in design and technical requirements, wasted time in the wrong direction is also mitigated by the emphasis on refining design with feedback directly from AVG. With most of the requirements already being explicitly defined by AVG in the CRM Requirements, this implies that there wouldn’t be many revisions necessary to achieve the expectations but the benefit of the iterative method provides the flexibility to make the refinements to achieve a very polished solution.

# Design

A flowchart is provided below to display the end-user experience when viewing a Contact record within the CRM system and traversing to the related Business record that was associated with the Contact record.

A GUI mock-up is also provided to demonstrate the end-user experience of generating a report for all Contacts that belong to a Business. The result of the report is also provided in the mock-up.

# Storyboard of Contact Record and Associated Entities

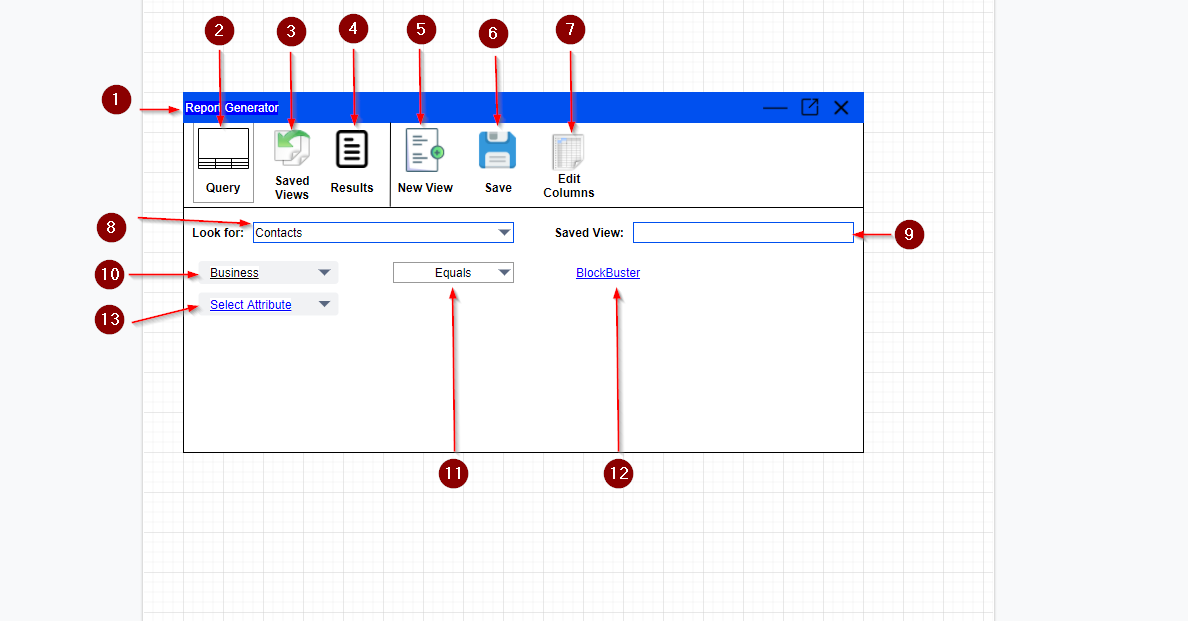
Below is a flowchart showing a high-level overview of the CRM webpage when viewing a Contact named “John Smith” and traversing to the associated Business entity “BlockBuster” found within the Contact.

A picture containing application

Description automatically generated

# Report Generator GUI

Below is a GUI mock-up of the on-demand report generation feature that will create a spreadsheet-like report based on the conditions defined by the end-user.



Example Report Generator Mock-up

|  |  |  |  |
| --- | --- | --- | --- |
| GUI Control Mapping | | | |
| ID | Control | Property | Data Source |
| 1 | Label | Text=”Report Generator” | N/A |
| 2 | ImageButton | On click of button, switch to “Query” page (currently selected) | N/A |
| 3 | ImageButton | On click of button, switch to “Saved Views” page where a list of predefined and custom saved queries are saved. | CRM |
| 4 | ImageButton | On click of button, generate results based on the query defined and switch to the “Results” page where the results of the query is displayed. | CRM |
| 5 | ImageButton | On click of button, clear out the query conditions and selected “Saved View” | N/A |
| 6 | ImageButton | On click of button, save the query conditions on the page to the pre-existing “Saved View” or prompt the user to provide the name of the new view being saved. | N/A |
| 7 | ImageButton | On click of button, display the “Results” table format and allow the user to add/delete/modify columns. | N/A |
| 8 | ComboBox | Drop-down menu of Data Types that are registered in the CRM system allowed for query. | CRM |
| 9 | ComboBox | Drop-down menu of predefined and custom queries that can be loaded into the query page. | CRM |
| 10 | ComboBox | Drop-down menu of attributes belonging to the Data Type being queried. | Registered Data Type in CRM |
| 11 | ComboBox | Drop-down menu of types of comparison operators to perform on the attribute. | NA |
| 12 | TextField | User-provided value related to the Attribute to complete the comparison operation. | NA |
| 13 | ComboBox | Drop-down menu for additional Attributes related to the Data Type used to query the report. | Registered Data Type in CRM |

# Testing

# Unit testing

Included below are three unit tests performed to verify the correctness in the functionality of different areas of the CRM system which include report generation, action auditing, and detecting unsupported browsers.

# Accurate report generation

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| **Requirement to be tested**  The CRM system must be able to accurately generate a report based on the conditions provided in the query. |
| **Preconditions**  Test user must have read and write permissions into the CRM system. |
| **Steps:**   1. Create a new “Business” entity within the CRM system called “BlockBuster”. 2. Create a new “Contact” entity within the CRM system with the *First Name* attribute set to “Test1” and the *Business* attribute set to “BlockBuster”. 3. Create a new “Contact” entity within the CRM system with the *First Name* attribute set to “Test2” and the *Business* attribute set to “BlockBuster”. 4. Traverse to the “Report Generator” page within the CRM system. 5. Set “Contact” within the “Look for:” drop-down menu. 6. Click on the “Select Attribute” drop-down menu and select *Business.* 7. On the drop-down menu on the right of the selected *Business* attribute, select “EQUALS” as the comparison operator. 8. Input “BlockBuster” in the provided TextField to the right of the “EQUALS” comparison operator. 9. Click on the ”Results” button at the top of the page to display the queried results. |
| **Expected results:**  The *Results* page should output a table containing two records related to the Contacts “Test1” and “Test2” created earlier in the test steps. Since the “BlockBuster” Business and the Contacts entities were created during the test steps, there should only be two Contacts outputted in the table. |
| **Pass/Fail:**  Pass, the *Results* page outputted the two Contacts that were created and associated to the “BlockBuster” test Business entity. |

# Accurate activity/actions auditing

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| **Requirement to be tested**  The CRM system must be able to accurately record user activity when performing actions within the CRM system that modify an entity record. |
| **Preconditions:**  Test user must have read and write permissions into the CRM system. |
| **Steps:**   1. Create a new “Contact” entity with the *First Name* attribute set to “Before” and take note of the timestamp shown on your local machine. 2. Wait at least 1 minute. 3. Modify the Contact and set the *First Name* attribute to “After” 4. Click on the “Save” button to append the changes to the Contact entity and take note of the local time on your local machine. 5. Click on the “Audit History” 6. Verify that the Contact *create* and *update* actions were logged 7. For both *create* and *update* actions, verify that the logs contain timestamps that match the timestamps noted from the local machine 8. For both *create* and *update* actions, verify that the name of the test user that performed the action was logged 9. For the *create* action, verify that the value for the *First Name* attribute was logged as “Before” 10. For the *update* action, verify that the “New Value” for the *First Name* attribute was logged as “After” |
| **Expected results:**  The *Audit History* page of the created Contact should contain two logs, one for the creation of the Contact and one for the Contact being updated.  Within the “CREATE” action being logged, the record should indicate that the Contact was created with the *First Name* attribute set to “Before”, the action was performed by the logged-in test user, and the recorded timestamp matches up with the time the test user took note of during the test.  Within the “UPDATE” action being logged, the record should indicate that the Contact was updated and the only attribute modified was *First Name*. The record should indicate that the “Old Value” for the *First Name* was “Before” and the “New Value” for the *First Name* was set to “After”. This log should also indicate that the update action was performed by the logged-in test user and the recorded timestamp of this action matches up with the time the test user took note of during the test.  A side effect of the log containing the “CREATE” action being performed is the audit log will also include lines within the log referencing all the attributes related to the Contact even though the test Contact was created by only providing a *First Name*. This is to indicate that the Contact was created with only a value provided to the *First Name* attribute and all other attributes were not provided a value. |
| **Pass/Fail:**  **Pass**, the Audit History tab of the Contact within the CRM webpage contained two logs referencing the “CREATE” and “UPDATE” action performed by the test user and the information indicated in the audit logs are accurate. |

# Unsupported browser Version detection

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| **Requirement to be tested**  The CRM system must be able to detect and notify the logged-in user that an unsupported browser is being used to access the system and provide a redirect link for more information. |
| **Preconditions:**  The test user must install old versions of all supported browsers within the repository linked below:  <https://testingdebugging.sharepoint.com/oldbrowsers> |
| **Steps:**   1. Log in to the CRM system using one of the outdated browsers that were installed from the repository. 2. A dialogue message should appear on the homepage indicating an unsupported browser version was detected. Click on the “confirm” button which will redirect your webpage to the list of supported browsers and versions. 3. Click on the respective link shown on the page to download the latest version of the browser detected or manually update the browser within the settings of the browser. 4. Delete local cache/cookies within the browser. 5. Open a new tab and log into the CRM homepage again (the dialogue box indicating an unsupported browser version should no longer appear). 6. Repeat steps 1-5 with each of the browsers installed from the repository. |
| **Expected results:**  When accessing the CRM system using the old version of a supported browser, a dialogue message should appear indicating that the version of the browser is unsupported and redirect the user to the resource page containing a link to the latest version of the browser.  Once the user updates the supported browser to the latest version, deletes the local cache/cookies, and logs into the CRM system again, the user should be able to access the system without being prompted to be redirected.  A side effect/expected behavior is if the CRM system detects an *unsupported browser* that isn’t within the list of supported browsers, the resource page will display a list of *all supported browsers* and contain links to the download pages of their latest versions. |
| **Pass/Fail:**  Pass - when using an unsupported version of a supported browser, the CRM system redirects the test user to a resource page. When the CRM system is being accessed using the latest version of a supported browser, the user was no longer prompted to update their browser and was free to navigate through the CRM system. |

1. [↑](#footnote-ref-1)