OG Health

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by

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This work is dedicated to my parents, family and friends for their support, sacrifice encouragement and love

Approval of the Viva-Voce Board

May 28, 2022

Certified that the thesis entitled **OG Health** submitted by **Prajjwal Tawri** to the Dr. SPM International Institute of Information Technology, Naya Raipur, India, for the award of the degree of Bachelor of technology has been accepted by the examiners and that the student has successfully defended the thesis in the viva-voce examination held today.

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I certify that

a. The work contained in the thesis is original and has been done by myself under the general supervision of my supervisor.

b. The work has not been submitted to any other Institute for any degree or diploma.

c. I have followed the guidelines provided by the Institute in writing the thesis.

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This is to certify that the thesis entitled, **OG Health** submitted by **Prajjwal Tawri** to Dr. SPM International Institute of Information Technology, Naya Raipur, Chhattisgarh, India, is a record of bona fide research work under my supervision and I consider it worthy of consideration for the award of the degree of Bachelor of Technology of the Institute.

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Acknowledgment

It has been an enriching and great learning experience while working with Deloitte USI on its project. I wish and express my heartfelt gratitude to my supervisor for hes guidance and suggestions throughout the project. Also, I wish and express my sincere gratitude to all my team members in the project for assisting and motivating me, for giving me time for discussions whenever I approached them so that I could come up with good work and without their faith and trust i would not be able to perform things successfully. I am indebted to the whole TNP Team for their support, cooperation, encouragement and valuable discussions.

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May 28, 2022
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Abstract

AI is now able to interact and understand cryptic clues and respond to questions that were essentially in unstructured format plain English. What this demonstrated was that AI was capable of "understanding" a question, refer vast amounts of data to obtain information, hypothesize, evaluate and then arrive at the most appropriate answer. We live in a world where 90 publications around the world and the vast repository of medical guidelines and protocols that keeps expanding and updating every year. We haven't been leveraging that vast expanse of unstructured data to make decisions.healthcare. There's a tremendous amount of information that is collected every day on the care of hundreds of millions of people . However, there is currently no way to connect that information, to link it to an individual across all the domains in which they get care, and the n to develop a holistic picture of who they are, disease profile and the best treatments for their situation at the lowest possible cost. Healthcare is a three trillion dollar busines and one of the biggest parts of our economy that has legacy technology infrastructure. OG Health leverages the power of AI to deliver better and customized patient care based on evidence based data. Consider this scenario:

1. A patient schedules a visit with his physician to discuss some symptoms
2. The doctor orders additional tests (if required) to investigate further.
3. The lab reports come back and the doctor is now in the analysis and hypothesis phase.
4. At this point the doctor takes the assistance of Watson. A pre requisite here is the physician practice has Watson installed as part of the practice health systems.
5. The physician simply states the question either in verbal or written as an English sentence to Watson
6. Watson accesses the patient record and interprets the question in several different ways

7. It comes back with ideas based on patient data and vast volume of literature. It comes up with an intentional list of several answers.

8. It runs each answer through the apparatus of a hypothesis and verifies against vast amounts of data and a cohort of patien ts with similar attributes or conditions

9. It then presents ideas with levels of confidence. It can also tell you what may be missing for a specific treatment plan s o t he physician may order that test and re evaluate

10. The physician can now make an informed decision based on the ideas presented by Watson discuss treatment plans with the p ati ent.

11. The patient may indicate certain preferences which may require a different approach. In which case the physician provides th at update to Watson and it goes back and analyzes with the new data point and comes back with revised list of ideas and confidence level.

12. The physician and patient agree on a treatment plan and Watson sends out the details to Insurance for authorization

In the above scenario the doctor is getting all of that data, across so many different physicians, crunched down into a very digestible format and recommendation that could then lead to the best treatment for that patient. For this to work OG needs copious amounts of data.This data and the idea was: Expose OG to that, and it finds patterns that physicians and anyone else can't possibly find when looking at that data, given all the variables in it.

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List of Abbreviations

LWC : Lightning Web Component

VF : Visual Force

CRM : Customer Relationship Management

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CHAPTER 1

Introduction

Preface

This chapter presents the introduction of the thesis and a brief overview of the company. The whole projects lie around Health care Automation, and this chapter provides a brief overview of the project's history. Further, the author discusses the thesis's objectives and presents the deliverables at the end of the project.

1.1 Introduction

In today's world there are many Multinational companies which do not have a defined system for procurement on a world wide basis. Since, there are different procurement needs, rules and regulations for different countries there is no central data of all the combined procurement works. This is where cloud procurement comes into the picture. This thesis is a combination of all the cloud procurement projects undertaken by the author as an Business Technology Analyst(BTA) intern at Deloitte USI.

1.2 About the Company

Deloitte Touche Tohmatsu Limited, or Deloitte, a network of professional services with offices in 150+ nations. With Head office in London, England, Deloitte is one among the Four Big accounting firms and the world's leading professional services network by revenue and number of professionals. With 334,800 experts spread throughout the globe, Deloitte provides audit, consulting, financial advice, risk advisory, tax, and legal services. In fiscal year 2021, the network generated total earnings of USD 50.2 billion. As stated by Forbes, Deloitte will be the 3rd biggest privately held corporation in the USA by 2020. The organization has backed different types of activities and events, including the 2012 Summer Olympics. The above-mentioned services are offered by Deloitte member companies, with country-specific variations in legal implementation (i.e., all within a single corporation or through various legal organisations operating as subsidiaries of a country's umbrella legal entity):

(i) Audit - Audit provides typical accounting and auditing services as well as internal audits, IT control assurance, and Media and Advertising Assurance to the organisation.

(ii) Consulting - Consulting provides services in the areas of strategy, analytics, and mergers and acquisitions, customer and marketing, core business operations, human capital, and enterprise technology and performance to clients. Deloitte's largest business, consulting, will account for more than 40

(iii) Financial Advisory - Financial Advisory provides clients with corporate financial services such as dispute resolution, personal and commercial bankruptcy, forensics, e-discovery, and other related matters.

(iv) Risk Advisory - Enterprise risk management, information security and privacy, data quality and integrity, strategic and reputation risk, regulatory risk, project risk and cyber risk,

and business continuity management and sustainability are all services offered by Risk Advisory.

(v) Tax and Legal - Tax and legal assists clients in increasing their net asset value, assisting multinational corporations with transfer pricing and international tax operations, minimising their tax liabilities, implementing tax computer systems, and providing tax advice on various business issues.

(vi) GovLab - GovLab is Deloitte Consulting LLP's Federal Government consulting practice's internal think tank focusing on innovation and government reform. GovLab was founded in 2010 at New York University in New York, New York., and typically undertakes eight or nine research topics per year, focusing on how future trends, technologies, and business models will affect government.

1.2.1 Consulting Division at Deloitte USI

Deloitte's consulting firm is categorized into three major service areas that spearheads the potential of businesses:

1. Human Capital - Uses research, analytics, and industry insights to design and implement important initiatives varying from business-driven HR to innovative talent, leadership, and change of management.

2. Strategy and Operations - Assists top executives in solving their most difficult and complicated issues by offering a implementable strategy that combines extensive industry knowledge, rigorous analysis, and insight to enable confident action.

3. Technology - Provides helpful solutions with which businesses transform, increase efficiency, and organize operations. Our practical, innovative solutions are related to quantifiable goals to help our clients acquire a competitive edge. Key transformative services, paired with our depth of knowledge and industry know-how, keep innovation flowing and drive growth:

    (i) Business Transformation services include business strategy, innovation, capability development, operating model design and effectiveness, organisation and service delivery design and effectiveness, technology strategy and implementation, strategic change management, and enterprise risk management security, and tax advisory services – All with the primary goal of assisting clients in achieving and maintaining maximum value.

(ii) Deloitte Analytics helps clients find ways to turn everyday information into actionable insights by embedding analytics across their organization's strategy, operations, and sys- tems, and by building analytics into core organizational areas, including customer, supply chain, finance, risk, and workforce

(iii) Deloitte Innovation blends a deep understanding of disruptive forces with industry experi- ence to generate new ideas and products, new business models, and new relationships that can help transform organizations, positioning them to address their most pressing current and future challenges.

(iv) Digital Transformation experts work at the " ideal spot" of intersection of strategy, execution, and creative talents to help businesses create new ways to make money, restructure how work is done, and rewire the competitive fabric of whole sectors..

(v) Finance Transformation assists CFOs and other finance executives in driving business performance and shareholder value while increasing the finance organization's operational effectiveness and efficiency.

(vi) Service Delivery Transformation assists firms in developing a flexible, scalable, and cost-effective platform for providing functional and business-enabling processes by combining shared services, outsourcing, and offshoring.

1.3 Literature Review

AI is now able to interact and understand cryptic clues and respond to questions that were essentially in unstructured format plain English. What this demonstrated was that AI was capable of "understanding" a question, refer vast amounts of data to obtain information, hypothesize, evaluate and then arrive at the most appropriate answer. We live in a world where 90publications around the world and the vast repository of medical guidelines and protocols that keeps expanding and updating every year. We haven't been leveraging that vast expanse of unstructured data to make decisions. As humans we are limited with the amount of data we're able to consume and process at a point in time. This limitation leads to certain kinds of human behaviors that consistently contributes to decision error. Per the science of decision errors, humans are prone to the below in addition to others:

1. Flaw of availability:- We overvalue and overestimate the impact of things that we can remember and we undervalue and underestimate the prevalence of the events we hear nothing about.

2. Self reinforcing perception bias:- where we seek out that which supports our original thought.

AI can help reduce the above two human decision errors.

1.4 OG Health

OG Health is an AI empowered SaaS, selling Healthcare Consulting products to Governments, Hospitals and Research facilities to revamp/optimize their existing healthcare solutions in a partner based business model.

OG Health's main goal is to digitize healthcare while also providing AI based smart suggestions to aid in the decision making process for Governments, Doctors and Researchers. Use cases include, but are not limited to

- Medical Imaging(using Convolution Neural Networks) to identify visual patterns which a Doctor may have not actually initially de tected.
- Patient centric disease detection pattern recognition (clustering Machine Learning models) and cost estimation of treatment (Lin ear Regressive Models).
- Governments can use Population based vulnerability analysis to pre determine future illnesses, their probability and impact.
- Governments can address fraud claims, reduce wastage of medications, vaccines, other equipment and channel them before they expire.
- Patient engagement, Connected ecosystem, Hospital ranking services for Hospitals.

The OG Health IT systems help health care providers, pharmaceutical research organizations and medical device companies analyze high volumes of patient and healthcare data that has been acquired over the years. The algorithms and systems are meant to optimize patient care and support clinical trials by combining patient health data points with all encompassing healthcare data and treatment options, e.g., hospital beds, pharmaceutical options, etc. to provide optimal treatment recommendations.

1.5 Objectives and Scope

The main reason for this project is to finds patterns that physicians and anyone else can't possibly find when looking at that data, given all the variables in it and reduce human intervention. Also, introducing automation reduces human error, which might go unnoticed in the

traditional manner of doing the same task. Keeping in mind these problems, the following are the objectives of this project:

(i) Provide leading Healthcare AI, Analytics, and Automation Services

(ii) Leverage state of the art, cloud-based technology to position OG for growth.

(iii) Employ a Cloud First philosophy when making technology adoption decisions.

(iv) Deploy a Zero Trust security model for all enterprise applications and infrastructure

(v) Ensure a positive user experience with technology, while not compromising enterprise security

(vi) Aim for rapid implementation of solutions, with minimal customization requirements

1.6 Methodology Followed

The program will require substantial changes to key business processes in a short timeline and the potential solution should implement industry best-practices for key process areas.The potential solution should cover "must-have" business requirements and assess readiness of IT infrastructure to enable / support standup and to minimize TSAs the Day 1 (Go-Live) solution should have minimum IT Transition services.

The approach for the implementation follows:

(i) Adopt a Preconfigured Solution:- A pre-configured, out-of-the-box solution using best-of-breed applications will enable

- Accelerated solution development.
- Implementation of industry best-practice processes.
- Coverage of standardized set of business requirements.

(ii) Eliminate / Limit Customizations:-Eliminate / Limit customizations to

- Reduce design complexity.
- Focus on "must-have" business requirements.
- Align scope with available timelines.

(iii) Day 1 and Day 2 Go-Live Design Validation:-Confirmation of design validation from relevant stakeholders for the following capabilities1:

- Back-office (Finance)
- Front-office.
- HR (Core HCM, Payroll).
- Workplace Technology (Directory Services SSO, Collaboration Messaging, Workstations Endpoints Management, IT Service Management Operations, Network Services).

1.7 Organization of the Thesis

This dissertation shows how a realistic model that can help others to understand your research work. The organization of this thesis is as follows.

Chapter 1 briefly discusses the introduction about the problem, why need the solution, and the benefits of using it.

Chapter 2 explains about all the technologies used in the project in great detail.

Chapter 3 presents the Software and Hardware Requirements for the projects.

Chapter 4 discusses in great detail about the planning done for the project.

Chapter 5 talks about the testing phases of the project.

Chapter 6 concludes the thesis with a brief overview of the journey to build the project.

CHAPTER 2

Technology Used

Preface

This chapter presents the main features of technologies, tools, and frameworks used for this project. The author has also discussed the importance of all the features of the tech stack used in the project.

2.1 Introduction

Technology, tools and frameworks used for the front end, middleware and backend of the projects are discussed in details in this chapter.

2.2 Front-End Technologies

The front-end of a software program or website is everything with which the user interacts. From a user standpoint, the front-end is synonymous with the user interface. From a developer standpoint, it is the interface design and the programming that makes the interface function. The front-technologies used in the projects are:-

2.2.1 Salesforce

Salesforce is a popular CRM tool for support, sales, and marketing teams worldwide.

Salesforce services allow businesses to use cloud technology to better connect with partners, customers, and potential customers. Using the Salesforce CRM, companies can track customer activity, market to customers, and many more services.

A CRM platform helps you go deeper with all your metrics and data; you could also set up a dashboard that showcases your data visually. In addition to this, you can also have personalized outreach with automation. Another significant benefit is that a CRM platform can also improve customer service's ability to help customers or a sales team's outreach efforts.

Salesforce Architecture

The different layers of the Salesforce architecture individually are:-

- Multi-tenant: Salesforce stores data in a single database schema. There can be a single instance of a software server with multiple tenants. Speaking about a multi-tenant architecture, there is a single shared application service to several clients. This makes it cost-effective. On the contrary, in a single-tenant, the development and maintenance cost must be entirely owned by one client. Hence the multi-tenant architecture is a boon.

- Metadata: Salesforce uses a metadata-driven development model. This allows developers to only focus on building the application. This metadata-driven platform makes customization and scaling up easy.

- API: Salesforce provides a powerful source of APIs. This helps in developing and customizing the Salesforce1 Mobile App. Every feature of the Salesforce design has been planned and implemented precisely.

Salesforce Services

The services offered by salesforce are:-

- SAAS (Software As A Service): Here, you can directly obtain the built-in software and make use of it.
- PAAS (Platform As A Service): PAAS offers you the framework and platform to build your websites and apps.
- IAAS (Infrastructure As A Service): IAAS plays a vital role in Salesforce development, although not very widely used.

Salesforce Cloud Services

List of the Salesforce cloud services that are offered by Salesforce are:-

1. Sales Cloud: It is one of the most essential and popular products of Salesforce. It is a CRM platform that allows you to manage your company's sales, marketing, and customer support aspects. Sales Cloud gives you the status of the lead that will be helpful for sales executives.
2. Marketing Cloud: Marketing is crucial when it comes to running a business. Marketing cloud lets you run campaigns, manage emails, messages, social media, content management, data analytics, etc., with the help of a tracking system.
3. Analytics Cloud: This enables users to create a highly visually appealing dashboard of the available data. By doing so, you can get an in-depth understanding and analyze the trends, business, and more.
4. IoT Cloud: Salesforce IoT cloud is used when your company needs to handle the Internet of Things (IoT) data. This platform can take vast volumes of data generated by various IoT devices; following this, you get real-time responses.
5. Salesforce App Cloud: You can use this service to develop custom apps that will run on the Salesforce platform.

6. Salesforce Service Cloud: Salesforce also helps you serve your customers. This is a service platform for your organization's support team. It provides features like case tracking and social networking plug-in.

These were a few of the top cloud services offered by Salesforce. Due to its diverse options, companies use Salesforce to assist with sales, marketing, and analysis.

Salesforce Applications

The few applications that make Salesforce a popular CRM:-

- Customer Service: Salesforce provides excellent customer service from anywhere in the world. It helps in resolving customer issues faster and improves support agent response time. Salesforce allows you to unify email, social, phone, and chat support and helps manage every channel from one view.

- Customize Data: Salesforce allows you to handle and customize different types of data. It helps you track real-time analytics and enhance the customer experience.

- Flexible Data Reporting and Analysis: Salesforce allows flexible data reporting and analysis. Here, sales representatives can create their reports to check the accounts they haven't worked on for a while.

- Understand Customer Data: The Salesforce tool makes you understand customer data, identify their interests and perception. You can locate and re-engage inactive customers and increase sales by tracking customer interaction.

Benefits of Salesforce

- Better Time Management:-Time management is a huge benefit of Salesforce and one of the best ways to allow a business to grow and thrive. Thanks to comprehensive customer information and useful planning resources, you have everything you need in one place. No more time wasted searching through logs and files for important info.

- Ultimate Accessibility:- Since Salesforce is cloud software, it's accessible anywhere and everywhere you have access to the Internet. Whether you use your desktop, laptop, or smartphone, Salesforce can be reached thanks to its app. This is important because many business owners and team members travel frequently, be it nationally, internationally, or even between cities.

- Increased Revenue:- Without Salesforce, running a business in today's world can cost you money. On any given day, your team might produce a ton of data that has to be stored. Without Salesforce, you're most likely sorting through this data manually, and this is more time spent on administrative work as opposed to building customer relationships.

- Greater Customer Satisfaction:- Similar to increased revenue, it's safe to assume customers are more satisfied when they interact with a business that knows their needs and the state of their relationship with you (thanks to your CRM tool). Spend less time on administrative duties and you'll have more time to spend catering to your customers through a common platform

- Simple Account Planning:- Salesforce makes it simple to create plans for accounts. With all the customer information you need readily accessible, you'll have an easier time placing that info into the correct accounts, and then making plans for those accounts for optimal results for the customer.

- Trusted Reporting:- With so much data pouring into your business, it's easy to become lost. Salesforce keeps pertinent data organized and it helps you make sense of new data thanks to trustworthy reporting.

  Keep track of all the data your business collects from social media, website analytics, app information, business software, and more. Reporting takes this mountain of information and sorts it, analyzes it, and makes it actionable. With the accuracy of Salesforce tech, you know the numbers are right and the readings can be trusted.

- Improved Team Collaboration:- Lastly, team collaboration is a major benefit of Salesforce. The software allows you to connect and communicate with team members from anywhere thanks to the "Chatter" feature. This lets you connect with individual team members or full groups and chat about everything from your clients and their information to other work-related topics such as territory and product/service details.

  When the team is on the same page, your business is more cohesive and operates more efficiently so that deadlines are met and sales are finalized.

2.2.2 DocuSign CLM

DocuSign CLM (Contract Lifecycle Management) allows you to streamline the contract lifecycle by automating manual tasks, orchestrating complex workflows and eliminating unnecessary risk. It provides document generation, collaboration, workflow, seamless integration

with DocuSign eSignature and a searchable repository for completed agreements. By enabling automation across the entire agreement process, you can accelerate the pace of doing business, increase compliance, and improve the employee and customer experience.

DocuSign CLM allows organizations to streamline the agreement lifecycle, by transforming analog manual processes into a digital automated workflow. The end result is an accelerated pace of doing business, increased compliance, and more efficient employees.

Key capabilities:-

- Automate manual tasks:- Generate agreements, facilitate negotiation, track redlines, and ensure version control.
- Orchestrate complex workflows:- Connect and track business processes across contributors, reviewers, approvers and more.
- Eliminate unnecessary risks:- Standardize and analyze the contract process while centralizing and securing agreements in a centralized repository.
- Contract generation:- Create preconfigured templates that pull data from third-party systems, allowing you to generate contracts with no manual data entry required.
- eSignature integration:-Send for signature with the world's leading electronic signature solution, DocuSign eSignature (sold separately).
- Conditional content:-Leverage business rules to drive the inclusion or exclusion of content sections by factors like geography and contract value.
- Rich integrations:-Prebuilt connectors and rich APIs enable key contract tasks tohappen within third-party business applications like SAP Ariba,Slack and Salesforce. Pull in data, generate agreements, get real-time alerts, kick off workflows and more.
- Dashboards and reports Create workflow and contract reports to uncover insights and monitor all contract processes. Visualize any report type and create chart-based dashboards to track key KPIs.
- Configurable workflows:- Drag and drop over 100 preconfigured tasks onto a canvas to map out and automate agreement processes across multiple contributors, reviewers and approvers.
- Collaboration and negotiation:- Send contracts for review, track changes across multiple versions, receive real-time alerts and maintain an audit record of who did what, when.

- Centralized searchable repository:- Store, tag and organize all contracts in a single, searchable place, with granular permission controls.
- CLM 360:- Use rich, discoverable metadata across all of your agreements and parties. Track renewals, report on obligations, view agreement hierarchies and identify total contract values
- Clause Library:- Your legal team can define a library of pre-approved clauses and fallback options for non-legal users to leverage during negotiation.

2.2.3 CPQ

CPQ is a sales tool for companies to quickly and accurately generate quotes for orders. CPQ applications often work in tandem with CRM platforms, ERP programs, and other business technology, which helps ensure integrated data as well as accuracy. Quotes produced with CPQ software are automated according to a preprogrammed set of rules, ensuring error-free pricing that takes into account quantities, discounts, customizations, optional features of products, multiple revenue types, and incompatibilities.

Sales reps spend just 34% of their time actually selling, and research shows that part of a sales team's non-selling time is spent generating quotes, proposals, and gaining approvals. When CPQ is deployed and used correctly, users have reported:

- 10 times faster quote generation
- 95% reduction in approval time
- Two times faster moving from quote to cash
- 30% quicker ramp for new reps

With its functionality and potential for excellent return on investment (ROI), CPQ software is on the horizon for many companies. CPQ adoption will continue to grow as companies see the real benefits of using it in conjunction with their CRM and ERP systems.

CPQ software eliminates a number of sales hurdles. Even when you see the benefits of a CPQ program, you may think your current process still fits the bill. But even if your current sales quote generation seems to be enough, be on the lookout for these six signs that you need CPQ:

- You're using legacy quote configurators.

- Revenue growth is outpacing your ability to operate.
- Revenue growth is outpacing your ability to operate.
- You're building a recurring revenue stream.
- You need practical ways to implement more advanced business solutions, such as software with artificial intelligence built in.
- You're sending inaccurate sales quotes to prospects.
- Someone manually reviews all your sales quotes.

2.3 Middleware Technologies

Middleware is software which lies between an operating system and the applications running on it. Essentially functioning as hidden translation layer, middleware enables communication and data management for distributed applications. It is sometimes called plumbing, as it connects two applications together so data and databases can be easily passed between the "pipe." Using middleware allows users to perform such requests as submitting forms on a web browser or allowing the web server to return dynamic web pages based on a user's profile.

The middleware technology used for the project:-

2.3.1 Boomi

Boomi AtomSphere is an on-demand multi-tenant cloud integration platform for connecting cloud and on-premises applications and data. The platform enables customers to design cloud-based integration processes called Atoms and transfer data between cloud and on-premises applications. Each Atom defines what is necessary for the integration.

The latest version of Boomi AtomSphere offers several new features, including a crowd-sourcing testing option called Boomi Assure and a bulk-copy feature that allows organizations to load large volumes of information into a database and increase the number of integration projects that can be centrally managed.

Applications supported by AtomSphere range from small business to enterprise class products and include Oracle E-Business Suite, Quickbooks and Hadoop HDFS, a technology commonly used for big data management. Currently, Dell Boomi's customers include Salesforce.com, NetSuite, SuccessFactors and SAP.

Boomi Capabilities

Boomi is capable of a number of exciting functions for businesses of all sizes. With the Dell Boomi platform, you have all the tools you would need to create and maintain integrations between two or more end-points.

- ETL (Extract, Transform, Load) – Of course! Boomi has the functionality to extract data from one application, transform it into the desired format, and then load it into another application or database. This is the foundation of all IPaaS applications, and Boomi does this very efficiently, I might add.
- Master Data Hub – Boomi has the functionality to act as the master data hub for your entire business. All of your business data can be analyzed in one application, allowing you to break down departmental barriers and siloed information.
- B2B/EDI Management – Boomi has the functionality to replace your current EDI solution by supporting the full range of trading partner communications and even the ability to define custom standards.
- API Management – Going hand-in-hand with an ETL tool is the ability to quickly create and deploy custom APIs, allowing you to connect with partners, customers, and other third parties with ease.
- Flow – Develop custom workflows that automate processes with functionality built right into the Boomi solution.

Important points about boomi

- Boomi is an IPaaS platform capable of connecting applications, databases, partners and customers.
- Boomi comes is sold in five separate tiers; starting with 2 end-points all the way up to 15.
- Boomis price scales with the number of end-points you want to connect.
- Boomi is a leader in the IPaaS category according to multiple trusted sources
- Boomi is consistently well-reviewed on trusted review forums
- Boomi is one of the pricier option available to users but is also packed with value.

2.4 Back-End Technologies

Activities that are done at the back end of programs are referred to as back end development. Back-end development covers server-side web application logic and integration and activities, like writing APIs, creating libraries, and working with system components instead of frontend development, which focuses on customer-facing services and programs. Backend developers build code that allows a database and an application to communicate with one another. Backend developers take care and maintain the back-end of a website, Including databases, servers, and apps, and they control what you don't see. Back-end Technologies used in the project are:-

2.4.1 Oracle Cloud

Oracle Cloud provides Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Data as a Service (DaaS). These services are used to build, deploy, integrate, and extend applications in the cloud. This platform supports numerous open standards (SQL, HTML5, REST, etc.), open-source applications (Kubernetes, Spark, Hadoop, Kafka, MySQL, Terraform, etc.), and a variety of programming languages, databases, tools, and frameworks including Oracle-specific, Open Source, and third-party software and systems.

One of the most trusted cloud platforms, the Oracle Corporation's Oracle Cloud, offers PaaS (Platform-as-a-Service), DaaS (Data-as-a-Service), SaaS (Software-as-a-Service), and IaaS (Infrastructure-as-a-Service).

Oracle Cloud's Infrastructure-as-a-Service includes FastConnect, Ravello, DNS Monitoring, Load Balancing, Database, Networking, Storage, and Compute.

The Platform-as-a-Service offerings incorporate Data Management, Business Analytics, Application Development, Cybersecurity, Content Management, and Integration.

The Software-as-a-Service includes Blockchain Applications, Analytics, the Internet of Things, EPM, SCM, ERP, HCM, and CX.

Data-as-a-Service is offered by the Oracle Cloud.

- Oracle Cloud Features
- Integrated and innovative cloud computing services
- AI-powered chatbots
- Next-generation data management
- High-grade security

2.4.2 Workday

Workday provides unified finance, human resources and student/faculty lifecycle management cloud applications designed for the way people work in today's organisations.Workday combines a lower cost of ownership with an innovative approach to enterprise applications

Workday Applications:-

- Financial Management:- A full range of financial capabilities includes analytics, real-time business insights, and fully auditable process management.
- Human Capital Management (HCM):- Workday HCM is the only global enterprise application delivered in the cloud that unifies human resources, benefits, talent management, payroll, time and attendance and recruiting.
- Professional Services Automation (PSA):- Workday Professional Services Automation is changing the game for organisations that manage and execute client-facing billable projects. Fully unified with Human Capital Management, Workday PSA streamlines recruiting, staffing, development and retention of your most valuable resource – your people.
- Insight Applications:- Insight Applications combine the historical analysis that Workday has always provided with non-Workday data. The applications then apply machine learning and data science to produce new insights to guide decision-making.
- Workday Student:- This end-to-end student and faculty lifecycle information solution is being designed to support institutional effectiveness and student success
- Integration Cloud:- Workday Integration Cloud makes it easy to build, deploy and maintain integrations and exchange data with your other application investments.

CHAPTER 3

System Requirements

Preface

This chapter explains about the specification and details of the system used while imple menting this process. Software Requirements and Hardware Requirements are listed in this chapter

3.1 Software Requirements

Softwares used in the projects are:

- Windows 10: Operating System to be used for development should be any version of Windows 10 64 bit. Most of the devtools are built for Windows Platform.
- Apex - Apex is a proprietary language developed by Salesforce.com. It is a strongly typed, object-oriented programming language that allows developers to execute flow and transaction control statements on the Force.com platform server in conjunction with calls to the Force.com API.
- LWC-LWC is a new programming model to develop Salesforce lightning components. It's a UI framework that is built using native HTML and modern JavaScript.
- VF pages-Visualforce pages are webpages that belong to Salesforce. These webpages are created using a unique tag-based Mark-up language. It is similar to HTML but it's primary use is to access, display and update the organization's data. The page is accessed by using a URL similar to that of a traditional webserver page.
- JavaScript- Javascript is used by programmers across the world to create dynamic and interactive web content like applications and browsers. JavaScript is so popular that it's the most used programming language in the world, used as a client-side programming language by 97.0
- Oracle Netsuite- NetSuite is used for enterprise resource planning (ERP) and to manage inventory, track their financials, host e-commerce stores and maintain customer relationship management (CRM) systems. This flexible platform can be applied to a range of business applications.
- Microsoft 365- Microsoft 365, formerly Office 365, is a line of subscription services offered by Microsoft which adds to and includes the Microsoft Office product line.
- Visual Studio Code- An open source highly advanced text-editor and IDE for code editing.
- JIRA: A huge project needs to be managed properly. JIRA is a project management tool by Atlassian which helps in managing bugs, issues, timeline tracking, and ticket features helps in associating commits of code to particular ticket number making it easier for the code reviewer to relate the code.

3.2 Hardware Requirements

Hardware Specifications of the systems used in the project:

- x86 based Processor: All the scripts are built for 64 bit x86 Architecture. Therefor similar processor needs to be used.
- 24GB RAM for development environment because of huge memory demands for better IDE functionalities and debugging features. 2-3GB RAM for production environment.
- Cloud Services are used for hosting all the production built. Cloud services provided virtual scalable environment for code to run without worrying about the bare metal beneath.

CHAPTER 4

Planning

Preface

This chapter discusses in great detail about the planning done for the project.

4.1 Introduction

The project's planning is depicted in this chapter. It explains how the project will get to its target by following the stages laid out for it.The Scrum process, Environment Strategy, Jira Process, Branching Strategy, and development standards utilised in the project are all detailed in this chapter.

4.2 Scrum Process

The Scrum process has the following agenda:-

1. Delivery Principles.
2. Scrum Ceremonies.
3. Proposed Sprint Schedule.
4. Estimation Approach Capacity Planning.

4.2.1 Delivery Principles

The principles below align our teams to deliver using principles to quickly deliver functionality which provide tangible business value while learning to continually improve operations over time:-

- SIMPLICITY IN DESIGN:-

  Simplicity is the art of maximizing the amount of work not done is essential.

- TECHNICAL EXCELLENCE:-

  Continuous attention to technical excellence and good design enhances agility.

- MEASURE PROGRESS:-

  Working software is the primary measure of progress. Measuring how functionality impacts business value is imperative to continual improvement.

- SUSTAINABLE DEVELOPMENT:-

  Delivery processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

- FACILITATE CONVERSATION:-

  The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

- SATISFY THE CUSTOMER:-

  Our highest priority is to satisfy the customer through early and continuous delivery.

- CATER TO BUSINESS AMBITION & CAPABILITIES:-

  Delivery processes harness change to foster innovation. Changes would go through review and approvals while adhering to scope and timeline.

- DELIVER QUICKLY AND OFTEN:-

  Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

- COLLABORATE:-

  Business, functional, and development resources must work together daily throughout the project.

- TRUST SUPPORT:-

  Build projects around motivated individuals. Give them the environment and support they need and trust them to get the job done.

4.2.2 Scrum Ceremonies

Scrum ceremonies are meetings that ensure that the scrum master, product owner and development team is in-sync. These ceremonies, or scrum events, are held at key instances in the agile sprint cycle, which we'll outline below. There are five scrum ceremonies, sprint planning, daily standup, sprint review, sprint retrospective and product backlog grooming.

The figure 4.1 give the detailed description of the scrum ceremonies:-

4.2.3 Proposed Sprint Schedule

The figure 4.2 shows the schedule.

Ceremony	Duration	Purpose	Owner	Attendees	Output
Sprint Planning	2-4 hours	To define Sprint goal and plan the work to be performed in the Sprint, including any items not finished in the previous sprint.	Scrum Master (SM)	PO, SM, Scrum Team Optional: Stakeholders	Sprint Backlog Sprint Goal Estimates
Daily Stand-up	15 mins	To inspect progress toward the sprint goal. Team describes for each other how their own work is going, ask for help when needed, and consider whether they are still on track	Scrum Master (SM)	SM, Scrum Team	Progress update Identified work for the day Impediments
Backlog Refinement	30-60 mins	To ensure the next few sprints worth of user stories in the product backlog are prioritized, that the items at the top of the backlog are ready for delivery and ready for sprint planning.	Product Owner (PO)	PO, SM, Scrum Team Optional: Stakeholders	Ordered User Stories Story Points Broken down large user stories
Scrum of Scrums	1-2 hours	To ensure the coordination and integration of output from the various teams by eliminating all impediments. E2E Process Design meeting will serve as Cross-functional meeting to review alignment of E2E process and solution components	Chief Scrum Master	SMs of each Scrum Team Optional : Product Owner	Clear picture of overall progress Cross-team impediments Cross-team impacts
Sprint Review & Demo	2-4 hours	To discuss and present the Product Increment delivered in the sprint and adapt product backlog based on the feedback.	Scrum Master (SM)	PO, SM, Scrum Team Optional: Stakeholders, Managers, other affected departments	Signed off increment Feedback
Sprint Retrospective	1-2 hours	Focus on the process. The scrum team discusses what went right and areas for improvement in the sprint, make tangible plans for how to improve their own process, tools and relationships.	Scrum Master (SM)	SM, Scrum Team	Improvements and actions that will be implemented in the next sprint

Figure 4.1: Scrum Ceremonies

Actor	Sprint n			Sprint n + 1	
	Week 1	Week 2		Week 3	Week 4
Developer	Development	Development (1 day) & Sprint Defect Fixes		Development	Development (1 day) & Sprint Defect Fixes
Tester	Sprint Test Authoring	Sprint Testing / Sprint Grooming		Sprint Test Authoring	Sprint Testing / Sprint Grooming
Code Review Team	Code Review			Code Review	
DevOps	User Story Deployment & Defect Fix Deployment			User Story Deployment & Defect Fix Deployment	
Scrum Team		Sprint n+1 Grooming & Planning			Sprint n+2 Grooming & Planning
PO		User Story Review & Approval / Sprint Demo & Sign off			User Story Review & Approval / Sprint Demo & Sign off

Figure 4.2: Proposed Sprint Schedule

4.2.4 Estimation Approach Capacity Planning

Story Estimations

Estimation exercise includes below points:-

- Assess the business requirements from the story.
- Gauge the complexity of involved technical design.
- Size the story in terms of story points on-
  - Development efforts.
  - Unit testing effort.

  - Code Review efforts.
  - Deployment efforts.

- Technical Design is supposed to be completed before starting sprint
- Estimations would be done by the respective scrum team before sprint planning.

Resource Capacity

Capacity is computed as below:-

- Sprint Capacity calculation would be done during sprint planning.
- USP per developer per day = 2 .
- Productive Sprint Days = 9 Days - Holidays - Planned leaves.

Sprint Capacity = Number of Productive Sprint days X USP per developer per day X Number of developers.

4.3 Environment Strategy

The Environment Strategy has the following points:-

1. Environment ecosystems and path to production.
2. Environment ecosystem, refresh mechanism and schedule.

4.3.1 Environment ecosystems and path to production

A well defined environment strategy sets the foundation for effective delivery phases.

- Environment strategy impacts all applications, and not only the ERP modules. This enables end-to-end functional validation across the entire stack including Workday, SFDC and the ERP.
- End-to-End environment ecosystems, including all applications, should be centrally governed to avoid cross functional issues
- Environment refresh strategy should align with pre and post go live release plans.

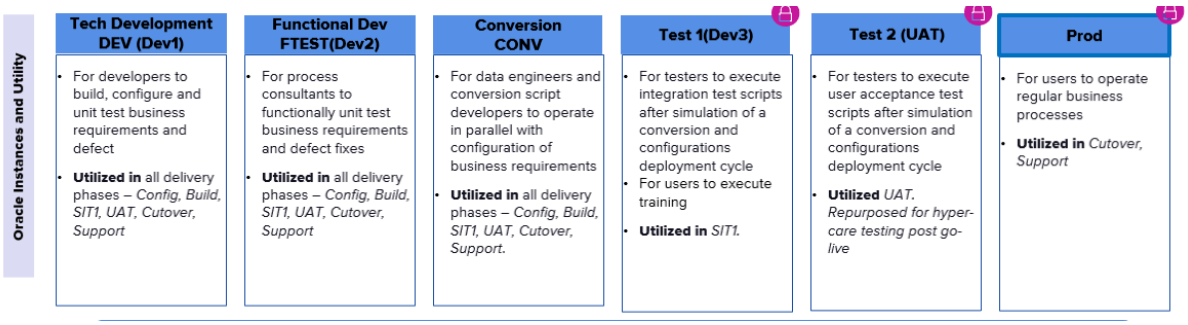

Figure 4.3: Project OG Health will require 6 new Oracle instances

4.3.2 Environment ecosystem, refresh mechanism and schedule

Oracle Instance Refresh Types

Oracle offers two types of instance refreshes – P2T and T2T:

- PRODUCTION TO TEST (P2T):-Source instance is the Production environment and the Target instance is a DEV/TEST environment.
- TEST TO TEST (T2T):-Both Source and Target are non-Production instances

Points to note:-

- Lead Time for the Refresh: Service Requests must be logged with Oracle at least 3-4 weeks in advance.
- Prerequisite for the clone/refresh: Both source and target environments must be at the same patch set level.
- Duration of Refresh: Could vary anywhere between 8-48 hours, including contingencies.
- Downtime: There is no downtime for the source environment during the refresh, however the target environment goes down during the refresh.

4.4 Jira Process

The Jira Process has the following Agenda:-

- Jira Issue Types , Sub-task Types.
- Jira Catalogue Examples.
- Jira Fields.

- User Story Cycle Workflow.
- Test Case Workflow.
- Bug Workflow (Non-Sprint Bugs).
- JIRA BOARDS.

4.5 Branching Strategy

4.5.1 Sprint User Story Promotion Path

- QA branch cut from Master Branch (1)
- DEV1 development sandbox code will pushed to QA branch (2)
- Delta deployment from QA branch to QA sandbox (3)
- Post Sprint testing in QA sandbox, code will be committed to Staging branch (4)
- Full deployment from Staging branch to SIT UAT sandboxes (5)
- When code is frozen for Release 1, a copy of Staging branch will be cut called Release 1 branch (6)
- Full deployment from Release 1 branch to Production (7)
- Release 1 branch will then be merged to Master branch (8)

4.5.2 Hot Fixes Promotion Path

- Hotfix branch to be cut off from Master and critical defects from Production to be addressed
- Hotfix branch will be deployed to Production, and as well merged back to Master

CHAPTER 5

Testing Strategy

Preface

This chapter discusses the different phases for the testing of the User Story.It also tells about the Testing Goals, Test Case Approach, Entry And Exit Criteria, Test Data Preparation, User Story Cycle Workflow, Bug Workflow, Test Case Workflow and Test Cycles.

5.1 Introduction

Testing is the process of evaluating and verifying that a software product or application does what it is supposed to do. The benefits of testing include preventing bugs, reducing development costs and improving performance.

5.2 Objectives

The test objective is to devise a robust testing mechanism that would ensure highest possible quality of the product and keeping a check on the health of the application while implementing the solution as part of OG Health Front Office.

5.2.1 Approach

- Analyzing the user story to identify any functional gaps.
- Detailed test scripting that include all possible scenarios based on acceptance criteria.
- Thorough sprint testing to ensure no defect leakage.
- Robust SIT to ensure all the components are well knit.
- Well defined defect management process to track the issues identified and intimate required stakeholders.
- Timely reporting of testing activities to all the stakeholders.

5.2.2 Outcome

- Well-groomed user stories across all features.
- High quality and stable end to end solution.
- Application with minimum defects leading to better end user experience.
- Defined defect management process to drive quick closure of defects by enabling better collaboration.
- Identification of early risk and impact with necessary mitigation plan.

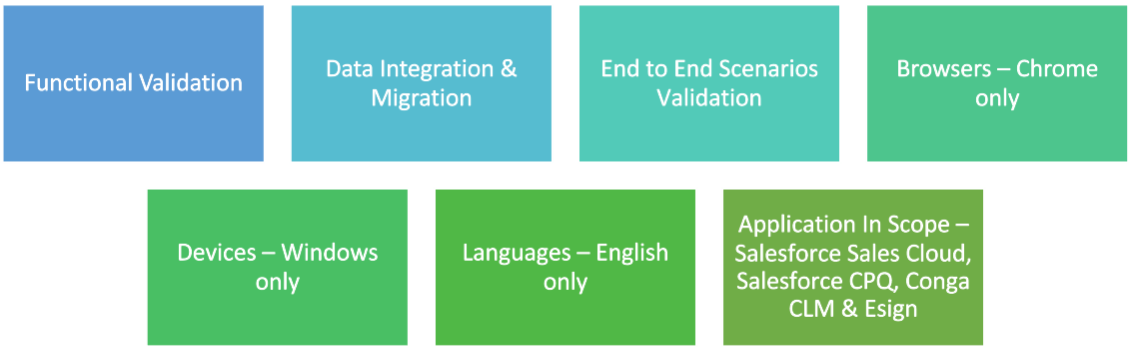

Figure 5.1: Scope

5.3 Scope

The Scope for the testing is depicted in the figure 5.1.

1. Testing scope will cover the testing of all the functionalities implemented.
2. Data will be manually created during sprint testing, migrated data will be used for testing during SIT/UAT (as much as possible)
3. Integration testing will be performed using stubs until end system is ready, this will be performed with support from development team.

5.3.1 Testing Goals

The testing Goals are depicted in the figure 5.2.

5.4 Test Case Approach

The test case creation process incorporates peer and SME reviews for deliverables and follows a top-down approach that begins with high level test scenarios and logically breaks them down into test cases. Approval checkpoints are included to ensure appropriate test scenario test case coverage.

Testing Phase	Goals
Unit Testing	• Isolate each part of the program and show that the individual parts are correct • Validate packages against relevant design / business scenario
Sprint Testing	• To validate the business functionality according to acceptance criteria of User story
SIT	• Ensuring integration of the functionalities are not creating new issues • Ensure there are no defects introduced as part of the new functionality
UAT	• Test end to end business needs to verify the solution is behaving as per the agreed scope.

Figure 5.2: Testing Goals

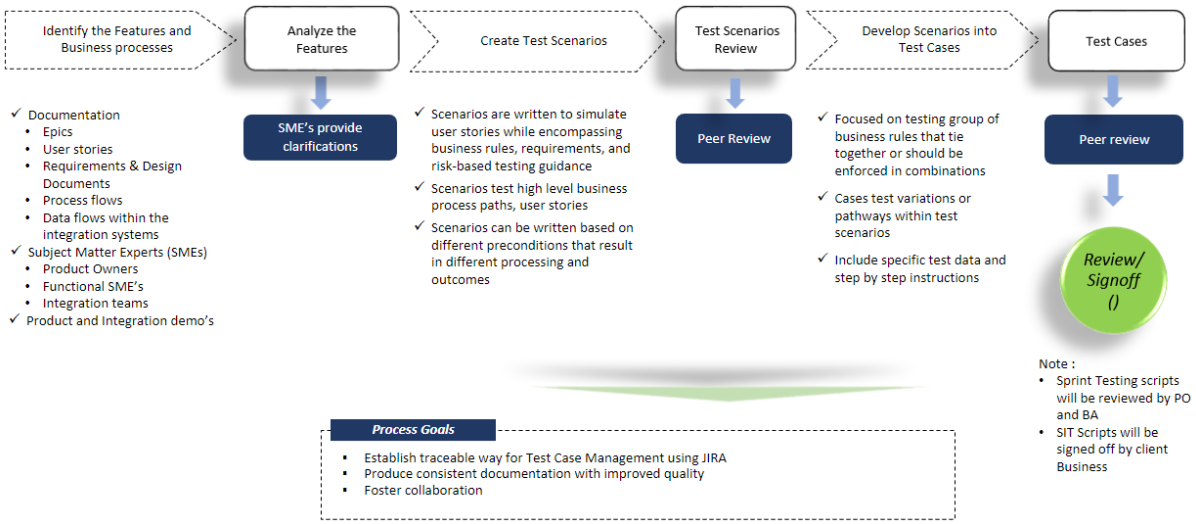

Figure 5.3: Testing Case Approach

5.5 Test Data Preparation

The Test data required for the QA, SIT and UAT testing will be identified prior to respective executions.

Key Considerations:-

- **Test Data** Testing will be performed with combination of migrated ,manufactured data , reference and configuration data.

  - Migrated data
    - Migrated data will be used during QA,SIT and UAT cycles as data will be made available.
    - Data team will own providing the required migrated data on target environments across different systems.
    - Any data refresh during ongoing test execution must be approved by testing team.
  - Manufactured data (i.e., new master and transactional data added manually).
    - Testers will be responsible to create data as required within the construct of the acceptance criteria.

- **User Setup**
  - Required users across application will be created with appropriate roles and profiles.
  - Delegate admin access will be enabled to test functionality with various personas.

5.6 WorkFlows

Different Workflows for the User Story Cycle, Bugs and Test Case are shown in the figures 5.4, 5.5 and 5.6 respectively.

5.7 Test Cycles and plans

A test cycle is a focused set of test cases that are grouped to achieve specific testing goals. Test cycles are usually larger and more broad in scope than test cases. Examples include regression tests, build-verification tests, end-to-end tests, etc.

From the Cycles view, you can create and manage your test cycles.

Test plans are used to track large-scale testing iterations, like an entire release or new version of your product. They give you the ability to generate reports about the progress of the entire testing iteration—information project management requires to gauge success, manage timelines, distribute resources, and plan future testing efforts.

From the Plans view, you can create and manage test cycles within a test plan.

5.8 Defects Priority

The Defects Priority is shown in the figure 5.7.

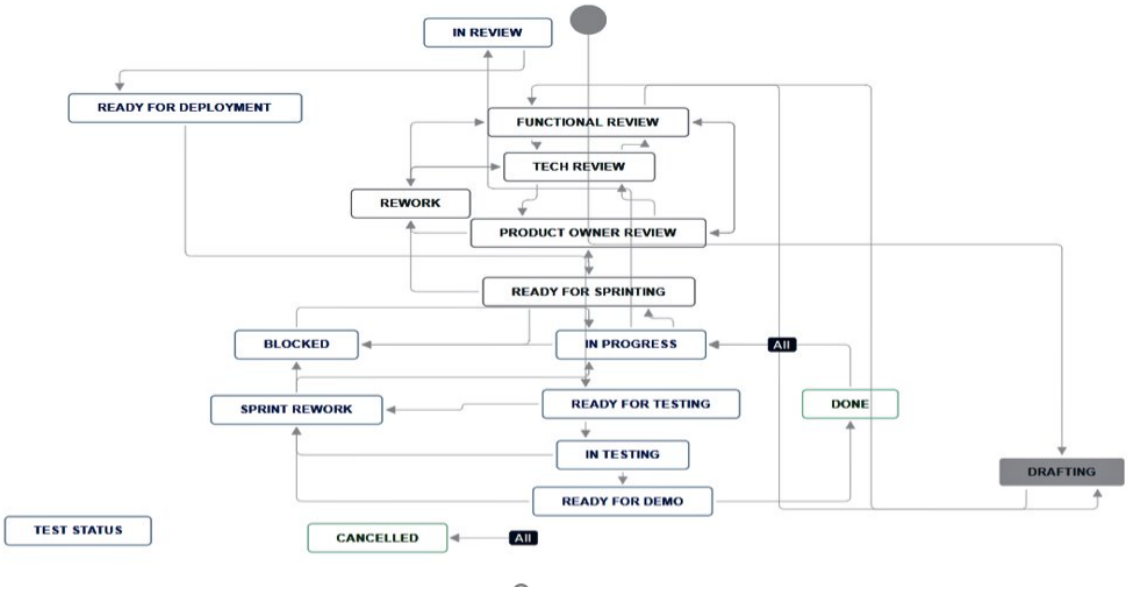

Figure 5.4: User Story Cycle Workflow

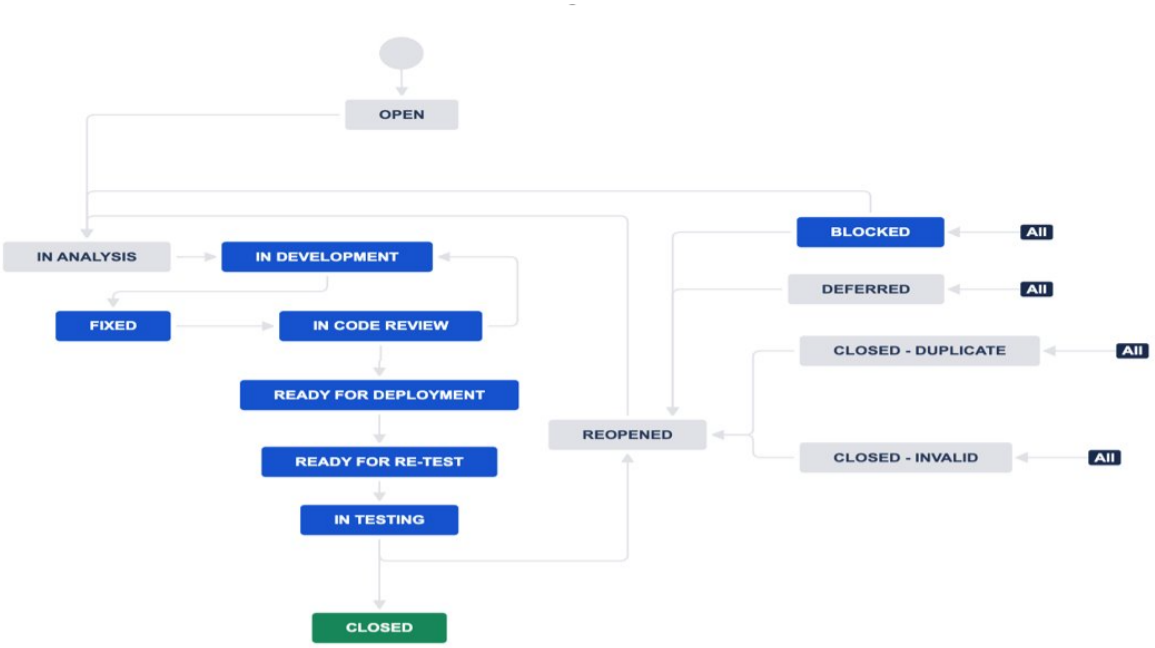

Figure 5.5: Bug Workflow

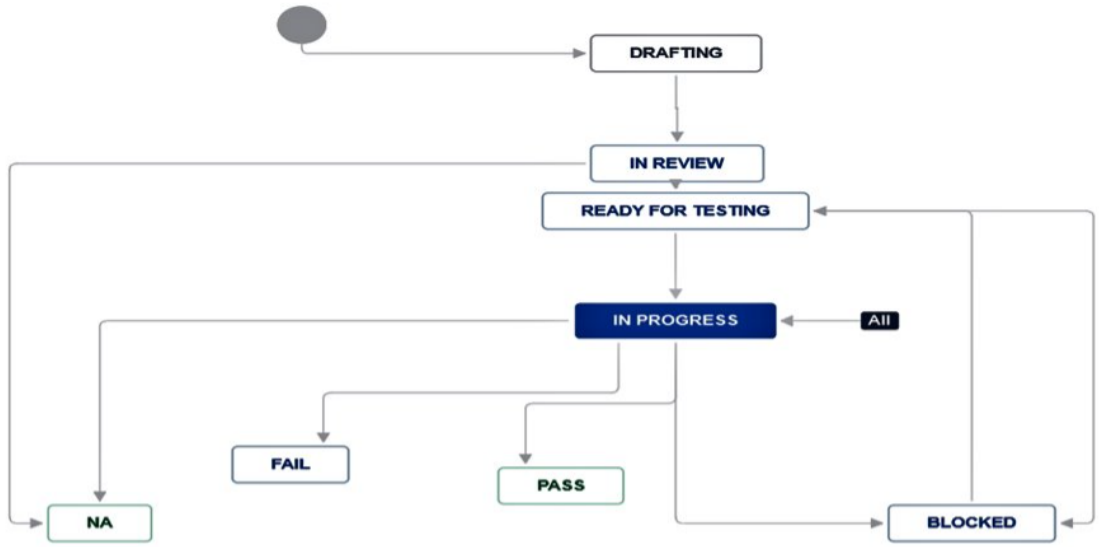

Figure 5.6: Test Case Workflow

Priority	Definition	Resolution
Critical	A serious defect has been encountered and should be resolved as soon as possible as it is blocking further effort	This needs to be fixed right now, everything else can wait, the build cannot be released with this defect
Very High	A severe defect has been encountered that is causing a significant impact, a major system component is inoperable, and a viable alternative does not exist	Needs to be fixed before any other defect should be fixed and urgency to fix it is greater than medium and low priority ones
High	A defect has been encountered that has minimal financial business impact or degraded service is experienced by a small number of users	Will be fixed in specific time-line.
Medium	A defect causes some undesirable behavior, but the system is still functional	May be fixed after based on agreed upon time
Low	A Minor defect has been encountered, cosmetic or visual, but does not hinder system performance or is intermittent with low impact to business operations or end users.	Fixing can be deferred until all other priority defects are fixed

Figure 5.7: Defects Priority

CHAPTER 6

Conclusions & Scope for Future Work

Preface

The final chapter of this thesis sums up the achievements in this thesis, based on the analysis and results presented. It also critically examines the examines the areas which are not studied in the present work, and outlines the areas where efforts need to be devoted to further the state of knowledge in the area.

6.1 Conclusions

Conclusions of your whole thesis.

6.2 Scope for Future Work

The future scope and possible extensions of the investigations carried out in this thesis are

(i) **Head line of scope for future work-1:**
Details of scope for future work-1

(ii) **Head line of scope for future work-2:**
Details of scope for future work-2

(iii) **Head line of scope for future work-3:**
Details of scope for future work-3

◇

References

(i) 'Workday' https://www.workday.com/content/dam/web/se/documents/datasheets/datasheet-about-workday-se.pdf

(ii) 'CLoud Platforms' https://www.simplilearn.com/top-cloud-platforms-article

(iii) 'Salesforce' https://www.simplilearn.com/what-is-salesforce-article

(iv) 'CPQ' https://www.salesforce.com/products/cpq/resources/what-is-cpq/: :text=CPQ%20is%20a%20

(v) 'Docusign' https://www.docusign.com/sites/default/files/resource_event_files/docusign_clm_datasheet

(vi) 'Boomi' https://emergetech.com/what-is-dell-boomi/

(vii) 'Scrum Ceremonies' https://www.projectmanager.com/blog/guide-to-scrum-ceremonies

(viii) 'Back-end' https://www.simplilearn.com/tutorials/programming-tutorial/what-is-backend-development

(ix) 'About deloitte' https://my.dnet.deloitte.com/

(x) 'Deloitte Business' https://resources.deloitte.com/sites/us/About/Bus/Pages/home.aspx

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