Major Project Report

On

SUPPLY CHAIN MANAGEMENT

long internship Project Submitted

In partial fulfillment of the requirements for the award of the degree

Of

BACHELOR OF TECHNOLOGY

Submitted By

N.Reddemma

R170567

Software Intern at TupleScale Technologies

Under the supervision of

B.LingaMurthy

(Software Engineer)

Department of Computer Science and Engineering

Rajiv Gandhi University of Knowledge Technologies, RK Valley

Idupulapaya, Kadapa(Dist), Andhra Pradesh

Rajiv Gandhi University of Knowledge Technologies

RK Valley Idupulapaya, Kadapa (Dist), Andhra Pradesh, 516330

CERTIFICATE

This is to certify that the project work titled " **Supply Chain Management" i**s a long internship submitted by **N Reddemma (R170567)** in the department of Computer Science and Engineering in partial fulfillment of requirements for the award of degree of Bachelor of Technology for the year 2022-2023 carried out the work under the supervision

Internal Guide
Mr.B.Lingamurthy
(Software Engineer)

Head Of Department
Mr.SatyanandaRam
(Assistant Professor)

Project Coordinator
M.MuniBabu
(Assistant Professor)

Declaration

I N.Reddemma hereby declare that this report entitled **"Supply Chain Managemnet"** submitted by me under the guidance and supervision of **B.Lingamurthy.** I also declare that it has not been submitted previously in part or in full to this University or other institution.

Date: 04-05-2023 **N.Reddemma**

Place: RK Valley **R170567**

Acknowledgement

I would like to express my sincere gratitude to **G.Bharath Kumar,** my guide at Adjoint Technologies for constant support for my learning and development. Special thanks to **TupleScale Technologies** for providing me with this great opportunity.

I am grateful to **B Lingamuthy**, **Internal Guide** for providing valuable suggestions and interest in progress.

At the outset, I would like to thank **Rajiv Gandhi University of Knowledge and Technologies** and **Tuplescale Technologies**, for providing all the necessary resources for the successful completion of my course work.

With Sincere Regards

N.Reddemma,

R170567.

Abstract

Sales and Operations Planning (S&OP) is an offshoot of production planning and owes its evolution to practitioners of operations management.It is looked at as an extension of aggregate planning and is considered as an integrated decision making process which connects strategic and tactical goals of an oraganization.Conceptually,the parameters of demand,supply,volume and mix are treated as four fundamental of S&OP.

Our project is Sales and Operations platform.

Sales and Operations Platform bridges the gap between demand and supply, by creating a collaborative and consensus driven forecasting and planning process that incorporates market intelligence. This solution also fosters S & OP collaboration with contract manufacturing organizations and channel partners and its powerful Rough Cut Capacity Planning (RCCP) and Inventory Planning solutions enable optimal scenario analysis and supply-demand integration.

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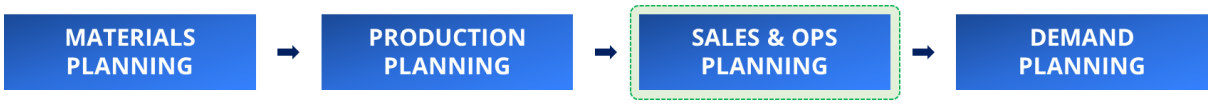
Supply Chain Management

INTRODUCTION

The Demand Planning Platform bridges the gap between demand and supply, by creating a collaborative and consensus-driven forecasting and planning process that incorporates market intelligence. The solution also fosters S&OP collaboration with contract manufacturing organizations and channel partners and its powerful Capacity Planning and Inventory Planning solutions enable optimal scenario analysis and supply-demand integration.



PROJECT EXPERIENCE (S&OP)

We developed and enhanced S&OP into a multitenant product with high scalability, extraordinary Performance, NextGen User Interface.

The solution is most comprehensive and capable end-to-end global supply chain software ecosystem combining networks, data, and applications to deliver enduring customer value.

Next-generation technologies: Java, ReactJS, MS access, Elasticsearch, Kafka, JGraphT, Airflow.

TEAM: Bharath, Ajay, Santhi G, Ravindar V, Reddemma N, Mounika C, Sai Marala, Udaya Sree A nd Kamal Deep were part of the core team building the supply-chain management planning platform.

Purpose:

With new revolutionary technology based architecture and analytics platform, users can make contextual business decisions using big data in real-time. The enhanced platform (Plan Streaming) provides multi-level comprehensive data cleansing across every facet of planning, forecasting and Enable rapid response to changing business needs and bridges the gap between demand and supply.

The planning platform enables companies who want to be ready to succeed with the cloud-based planning platform for every need across their organization. It’s the

foundation for our technology, providing the toolkit to enable you to assimilate information from a wide variety of sources, to cleanse and analyze that data, allowing you to align understanding and expectations across your organization – so that you can be ready to act.

KEY MODULES and FEATURES

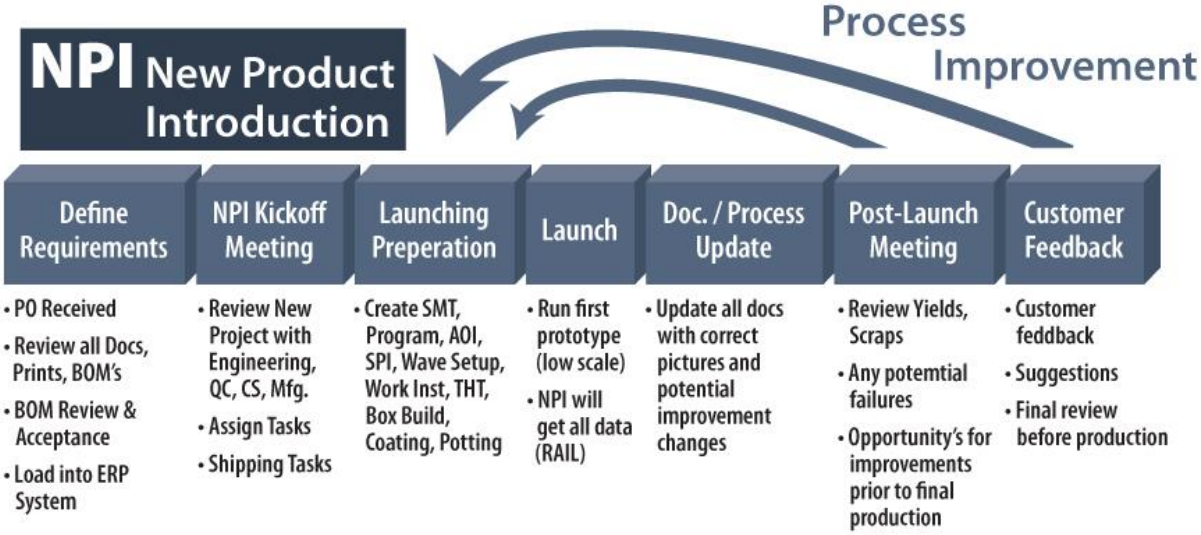
Automated Demand Forecasting	Collaborative Sales Forecasting	Integrated Business Planning
Automated Demand Forecasting optimizes the Demand Plans for the highest accuracy and fidelity for every channel at the most granular levels to prepare for the most volatile conditions with no Opportunity or Inventory Loss	Improve forecast accuracy with accelerated forecasting and deeper analysis with Collaborative Sales Forecasting.	Integration of information and processes to enable a more flexible, accurate, and faster E2E network
▪ Statistical forecasting in the Planning Process ▪ Demand Driver Analysis ▪ New Product Forecasting	▪ Forecast accuracy with real-time collaboration ▪ Composite dashboards with improved accuracy ▪ Controls for sales forecasting process	▪ Gain additional flexibility in supply ▪ Increase overall speed of network Improve accuracy of forecast – the first time

Features:

- **New Product Introduction Modeling**

  This feature that allows forecasting new products. Challenges during NPI modelling are Absence of historical data, Replacement for an existing product, positioning the new product vis-à-vis old product, Retaining the

customer base, Avoiding shortages and excess inventory. SW models new product forecasting using Standard Curves and using the similar product.



- **Exception Based Planning** :

One of the biggest issues in demand management is dealing with unexpected changes. These unanticipated changes in demand render management plans useless, and send managers into crisis mode. However, there is a better way to stay on top the unpredictable world of demand management. Exception based demand management is the best way to streamline the supply chain while still being prepared for sudden changes in demand.

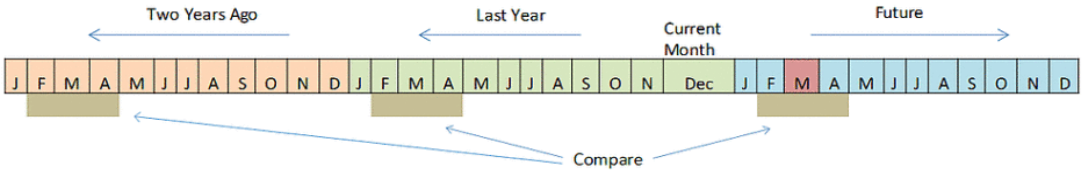
What is Exception Based Management?

An exception is any deviation from the acceptable business process planning strategy that the organization has implemented. Exception based demand management uses a forecasting process that also identifies anomalies in the forecast. You are then able to proactively make corrections before any damage is caused.

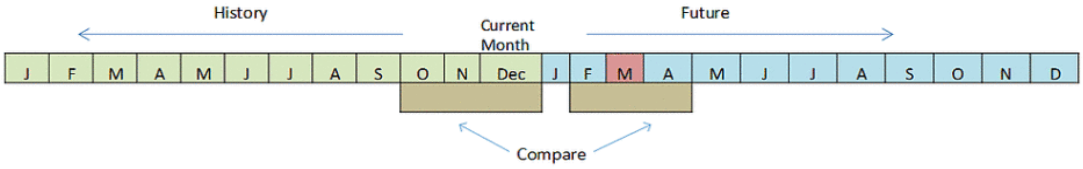
EBP is a key new module in Planning Platform and a key component for our customers managing 'big data'. In short EBP is a practice where deviations from a plan are brought to the attention of the user by exception instead of needing to review everything all of the time. It means resources are much more efficient in tracking down and resolving problems

Illustration

Rule 1



Rule 2



- **SMART TAR:**

  SMART TAR stands for Template Assignment Refresh. SMART TAR is valid for Templates associated with Filtered List. Post data load, Filtered List may get modified because of new Items addition, Discontinuation of Item, movement in hierarchy etc. These actions put the need for refreshing the filtered list and Template Worksheet in the background process.

- **Business Rules:**

  The power and robustness of business rules can be utilized in many ways depending upon business requirements. Business rules can not only automate time series computations but also scan across the total horizon and perform time series computations, aggregations and disaggregation based on different time anchors and set events. The core capabilities of Planning platform Business Rule Framework are listed as follows.

  - Hierarchy Aware Business Rules
  - Forward Chaining Capability
  - Time Phase Triggering Capability
  - Time Aware Business Rules
  - Disaggregation Logic
  - Capability of being triggered by Master Data Attributes

- Business Rule Validation Framework.

- **Mobile Dashboards:**

  Uses OLAP architecture and Roambi Analytics to display dashboards in Mobile (IPhone or IPad). The Platform's Insight mobile app runs on a configurable cloud platform that easily adapts as your needs change. You can perform critical S&OP functions on an iOS device with just a few taps of your finger.

- **Analytics Reports**

  This feature that enables to fetch data in the reports from OLAP cube. The key benefits of OLAP reports are fast processing of reports, report jobs not being blocked by any of the other jobs in the environment.

- **Report Scheduling:**

  System allows the users to schedule reports through the UI. When user needs easy access of Reports with latest data through mails without logging to SW application, it allows the users to schedule a report. Admin users can assign or distribute reports to users through this feature. Admin users are responsible for creating user groups, adding user(s) to this group and assign a particular report to this user and he can set a schedule for this assignment. This schedule can be a recurrence or on multiple dates basis.

- **Web Templates:**

  The templates allows user to view the updated planning data and provides user to perform changes/overrides as required and can refresh to see the latest data. Usability is a major driver in Web Planning as it uses IE browser for opening the planning template with data.

- **Telescopic Planning:**

  System provides the capability to perform more detailed level planning, by zooming into the smaller planning buckets, for near term horizon. Thus, while overall forecasting & planning is done at one bucket size, say monthly. Executives can plan at more detail level in smaller bucket, say weekly, for near future.

This planning platform is integrated with a Cognitive Sourcing system which combines market intelligence and enterprise data with artificial intelligence to identify opportunities and risks for enterprise sourcing teams.

PlatformData will enable Unilever to leverage the AI and Machine Learning process to drive scalability, process improvement, incremental cost saving opportunities and risk avoidance for direct material supply chain. Many of PlatformData's customers and target market have underinvested in innovation for the direct materials sourcing process.

The unique PlatformData Cognitive Sourcing Platform allows customers to sense, recommend, act, and learn

- **Cost Management System** Platform's Cost Management System specializes in providing Part Level opportunity thus increasing Customer data visibility. It analyses key indicators and provides actionable insights to the user with the help of mix-n-match filters, which can be used to optimize the sourcing process.

It includes features like **Internal Analytics, Opportunities, Negotiation Playbook**

- **Market Intelligence** is information about customers, data about room for entry/growth in a market, capturing market share, competitive intelligence and much more. While each type of marketing intelligence is different in its own way, all of them are important for, setting prices, developing content, and designing and implementing business strategies

This includes Benchmarking, Competitiveness, Partmatching, Raw Material, Predictive costing

- **Smart RFX** solution you can collaborate with your suppliers spanning everything from information sharing, collaborative data gathering all the way to the end-to-end Quote, Bid, and Award process. Platform is able to witness thousands of negotiations on the platform, observe where both parties started, what negotiation levers were most effective, how the negotiation evolved to final agreements and awards, and then continuously earn from all this community interaction to offer actionable insights for future negotiations.

- **NPI (New Product Introduction)** solution that enables early engagement and cross functional collaboration between New Product Program Management,Engineering, Supply Chain and Sourcing teams to accelerate time to margin and reduce risks as they shape the supply chain for new product programs

- **Supply Risk navigator** Risk Solution to help companies protect margins and revenues in these times of economic crises

Integrated Business Planning:

IBP reduces Supply / Demand mismatch

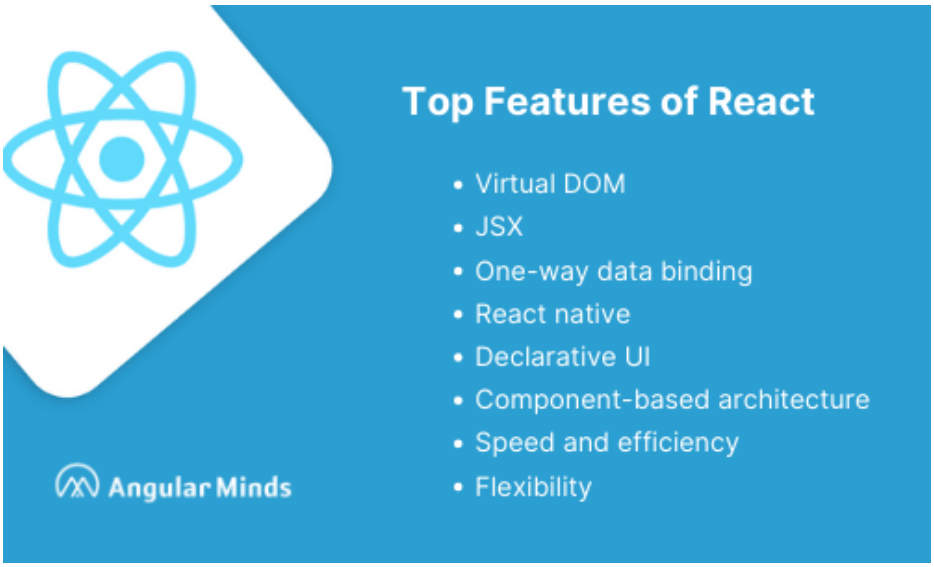
IBP is a process for aligning a company's business goals with its finance, supply chain, product development, marketing and other operational functions. Think parts suppliers that work with automakers and need to constantly retool to accommodate design changes, or food producers operating on razor-thin margins that must manage both uncertain supply chains and fickle customer tastes.

Technology Stack:

1.React JS:

ReactJS is an open-source JavaScript library used for building user interfaces (UIs) or front-end web applications. Developed by Facebook, ReactJS allows

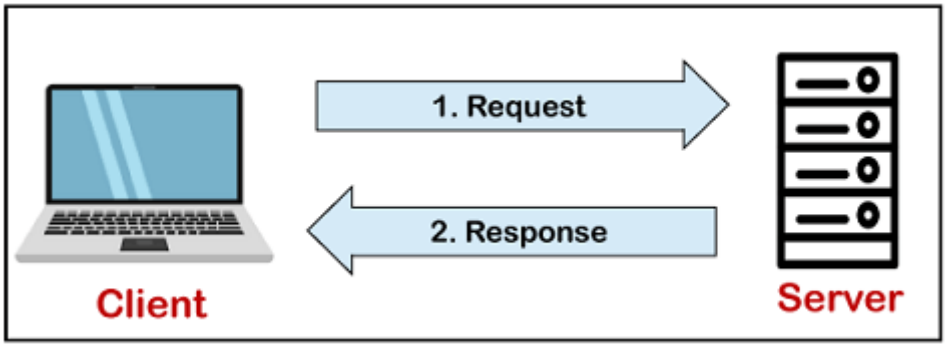
developers to create reusable UI components and manage the application's state using a component-based architecture. ReactJS uses a declarative approach to describe the user interface and allows developers to easily update the view when the application state changes.



2.MySQL

MySQL is a relational database management system based on the Structured Query Language, which is the popular language for accessing and managing the records in the database. MySQL is open-source and free software under the GNU license. It is supported by **Oracle Company**.

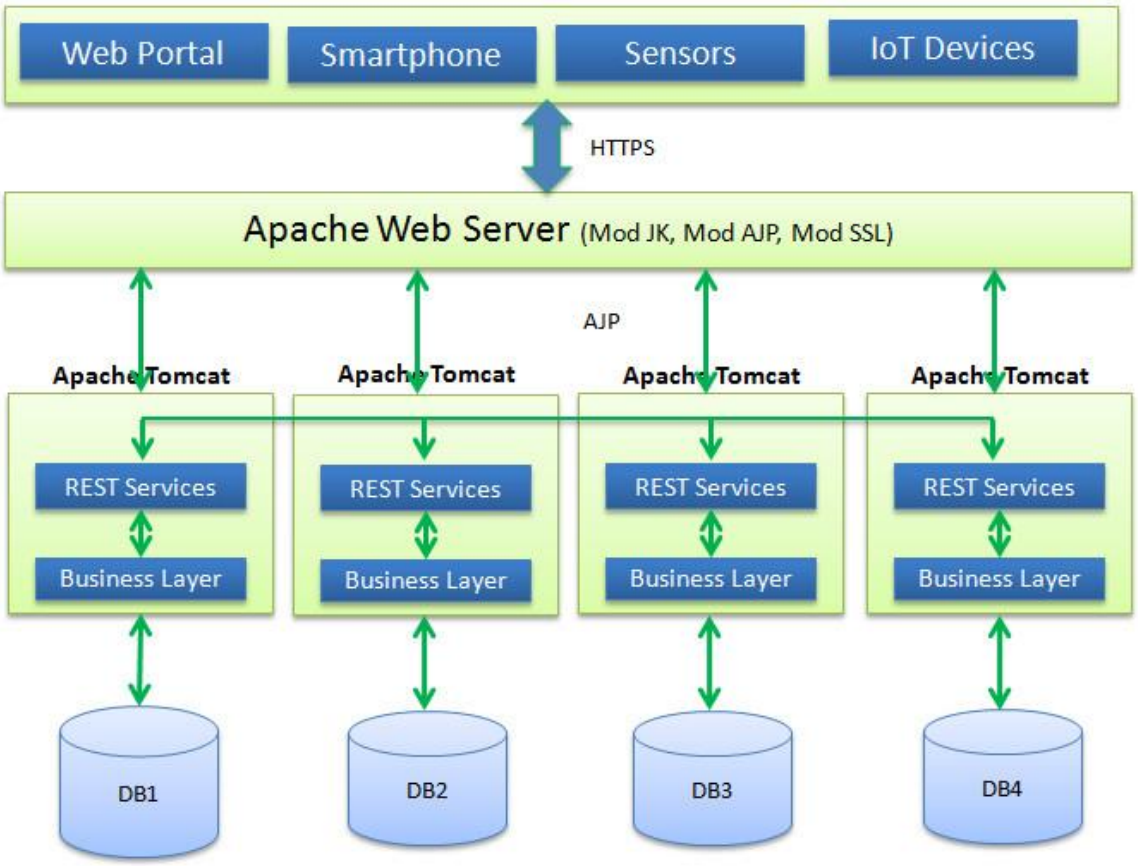
How it works?



3. Java/j2ee-Microservice architecture

The term Microservice is becoming popular since last few years. This is a way of designing a software system as a bundle of independent services.

These bundles can be deployed independently. This architectural pattern is more focused on scalability, loosely coupled and easy to maintain. This is most suitable for variety of different clients including Internet of Things, devices, desktop browsers, mobile browsers and native mobile applications. These services can also be used for integration with third party systems.



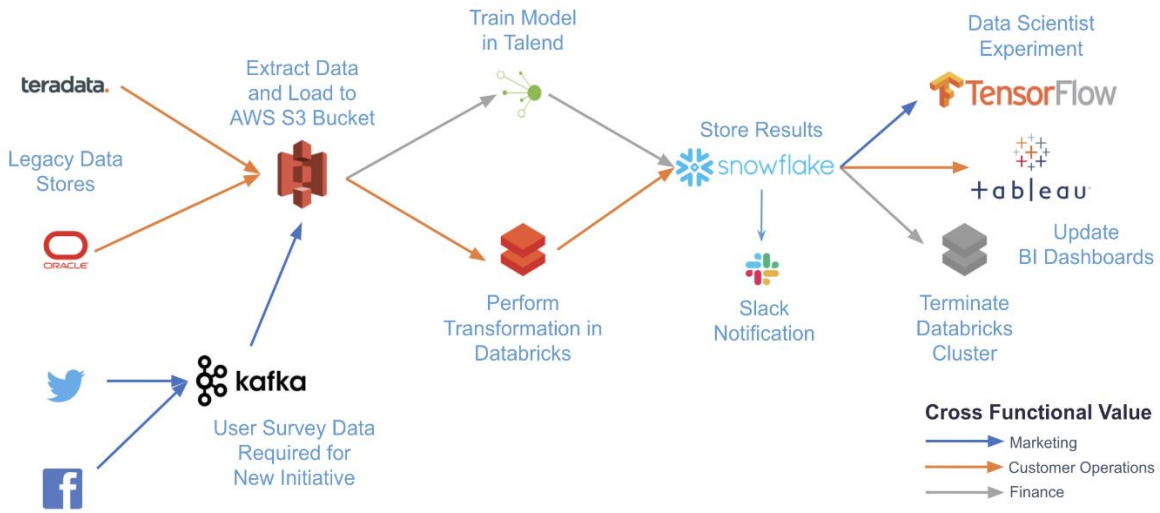
Services as component

Component is a software unit that can work independently and easily replaceable and upgradeable without affecting the functionality of the other component. Microservice architectures will use libraries, but their primary way of componentizing their own software is by breaking down into services. We define libraries as components that are linked into a program and called using in-memory function calls, while services are out-of-process components who communicate with a mechanism such as a web service request, or remote procedure call.

4.JGraph:

JGraph is a Java-based graph visualization and editing library that allows developers to create interactive and customizable network diagrams, flowcharts, and other types of graphs. JGraph supports various layout algorithms, including hierarchical, tree, and force-directed layouts, and provides a rich set of user interaction features, such as zooming, panning, and selection. JGraph can also be integrated with other Java frameworks, such as Spring and JavaFX. One of the key features of JGraph is its support for various file formats, including XML, JSON, and SVG, making it easy to export and import graph data from different sources. JGraph is widely used by enterprises, research institutions, and universities for visualizing complex data and systems.

5.AirFlow:



Airflow is an open-source platform used for creating, scheduling, and monitoring workflows. It provides a way to programmatically author, schedule, and monitor workflows or pipelines, which can include tasks such as data processing, ETL (extract, transform, load), and machine learning. Airflow has a powerful UI and API that allows users to visualize and manage their workflows, as well as monitor their performance and track progress. Airflow also supports a wide range of integrations with other technologies and services, such as databases, cloud providers, and message brokers.

6.Elastic Search:

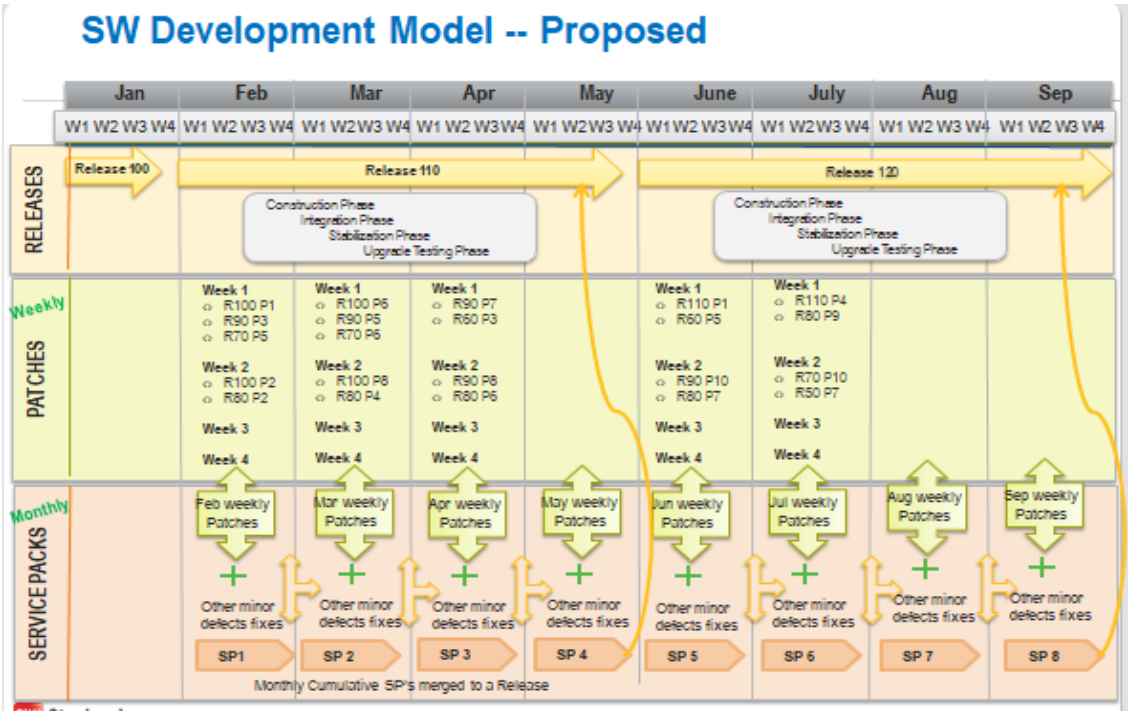
Elasticsearch is a distributed, open-source search and analytics engine that provides a fast and scalable solution for searching and analyzing large volumes of data. Elasticsearch is built on top of Apache Lucene.

A powerful full-text search library. Elasticsearch supports various types of data, including structured, unstructured, and geospatial data, and provides powerful search capabilities, including full-text search, faceted search, and real-time search. Elasticsearch also offers features such as data visualization, alerting, security, and machine learning. With its RESTful API and powerful query language, Elasticsearch can be easily integrated with other technologies and services, making it an ideal solution for enterprise search and analytics.

Software Development Model (Product engineeing):

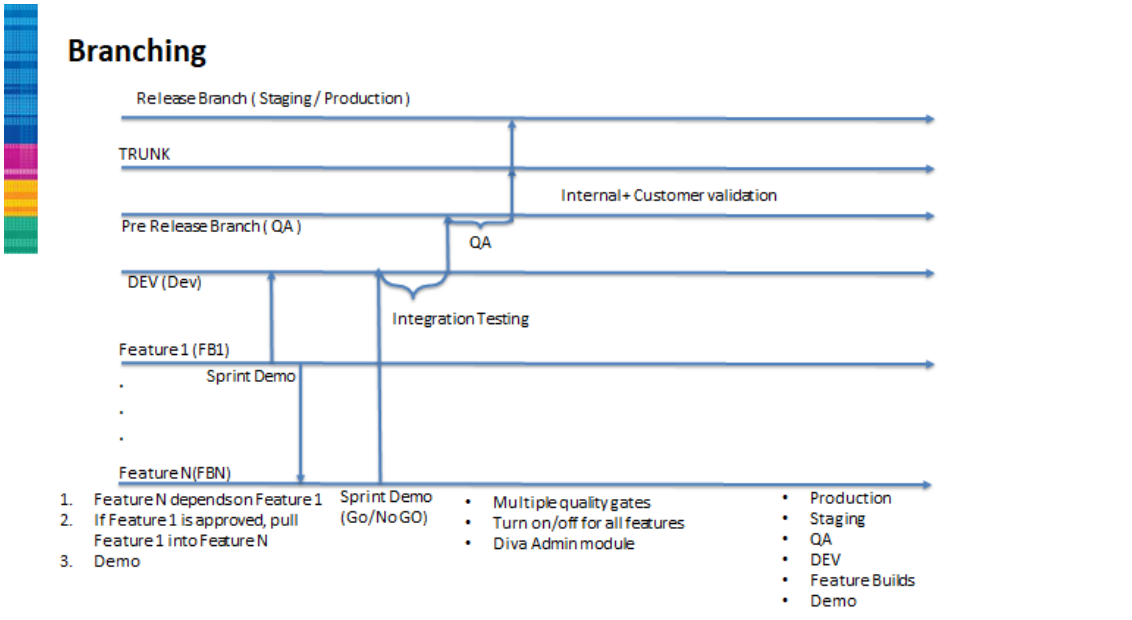
Agile Development Agile:

The Agile methodology is a way to manage a project by breaking it up into several phases. It involves constant collaboration with stakeholders and continuous improvement at every stage. Once the work begins, teams cycle through a process of planning, executing, and evaluating. Continuous collaboration is vital, both with team members and project stakeholders.

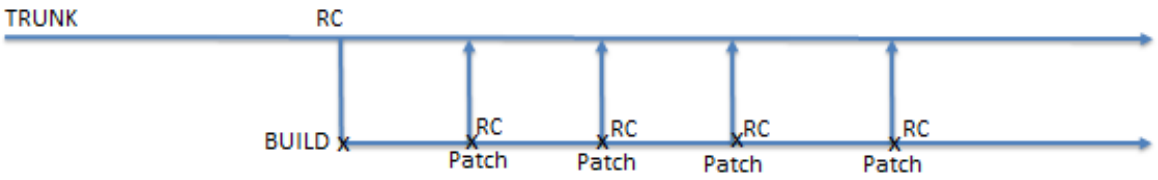


Platform Branching & Release Strategy:

Branching:

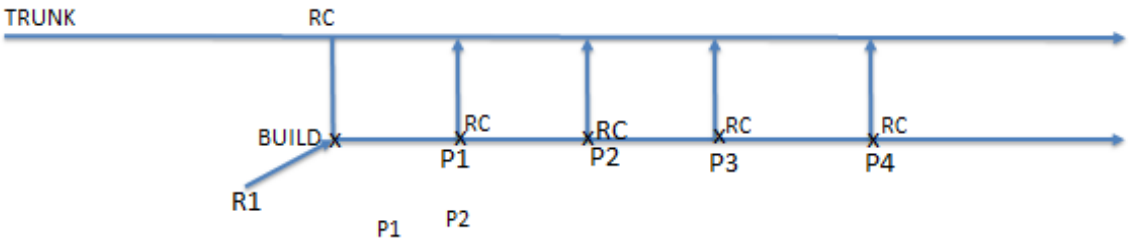


Versioning:



- This process assumes that Sprint 11 + 12 has already been applied in production
- The steps enumerated below are for Sprint 13 release and beyond
- Create a branch from TRUNK for the current version in production. Branch name will be the starting revision number of this branch.
- The current production build will be 0.5.<Branch Rev number>.0
- Merge the Sprint 13 code from TEST branch to TRUNK
- Perform testing and create a new BUILD branch for Sprint 13
- Perform sanity testing and tag the base release
- Deploy this tag on the staging site and have the services team perform testing
- Fix any critical issues that are found. If fixes are needed then create a patch as shown above.
- Deploy the base release + patch on the staging environment
- After the release is approved apply the release + patch on the production environment
- At any given time there will be only one release in production.
- Staging will be the mirror of production except when the next release is being tested
- Every week push data from production to staging

Patching:

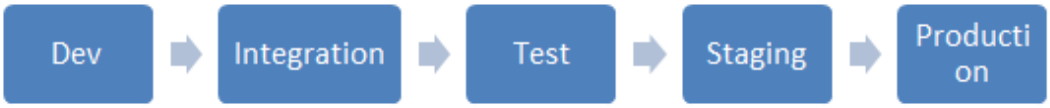


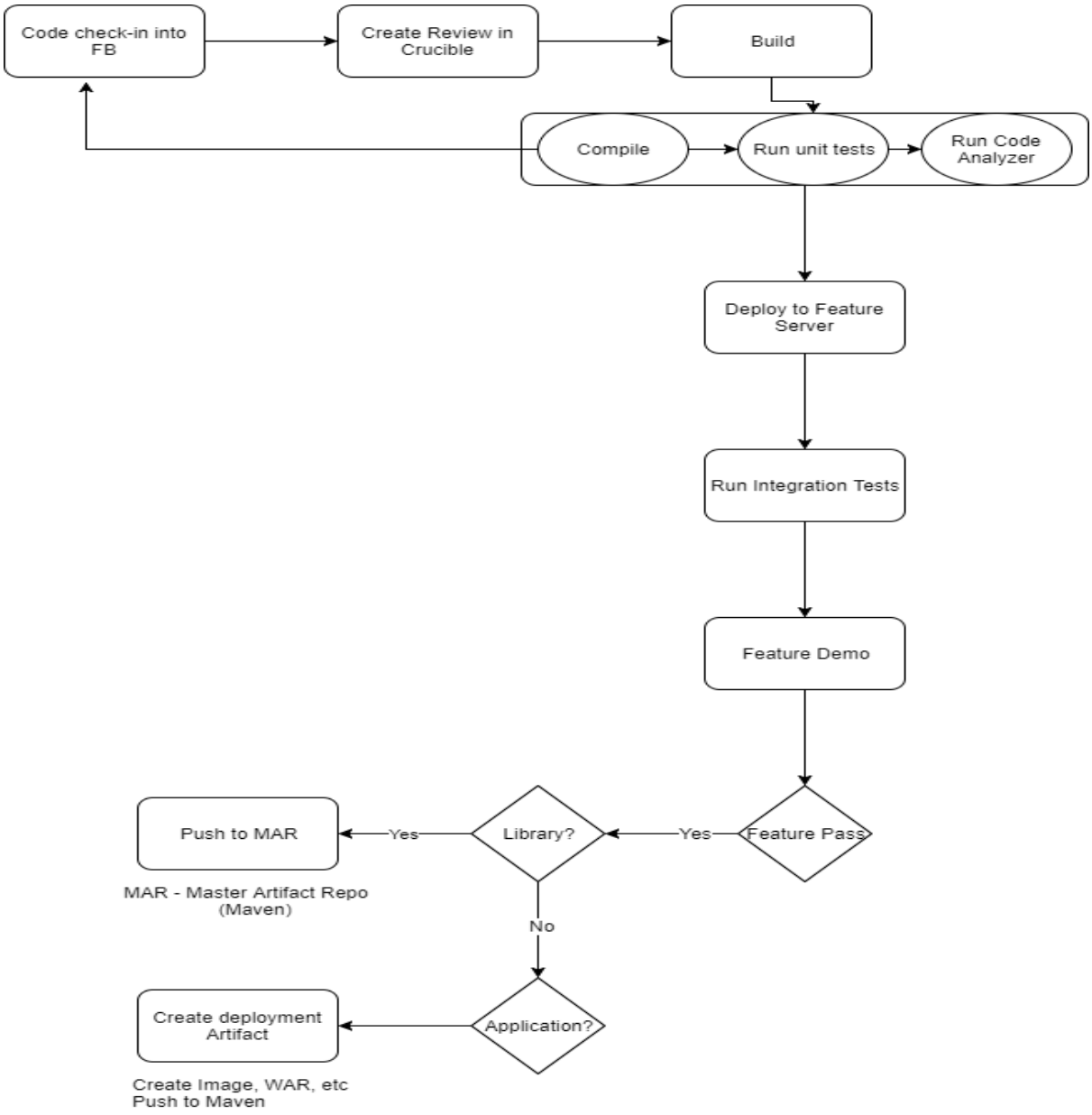
- R1 – base revision for this release
- P1 … P4 are patch releases
- Patch releases are full releases and not delta
- Patches have to be computed the same way for each micro-service, React and Django
- For each released version of the product we need to keep track of each component's version.

Build Enhancements:

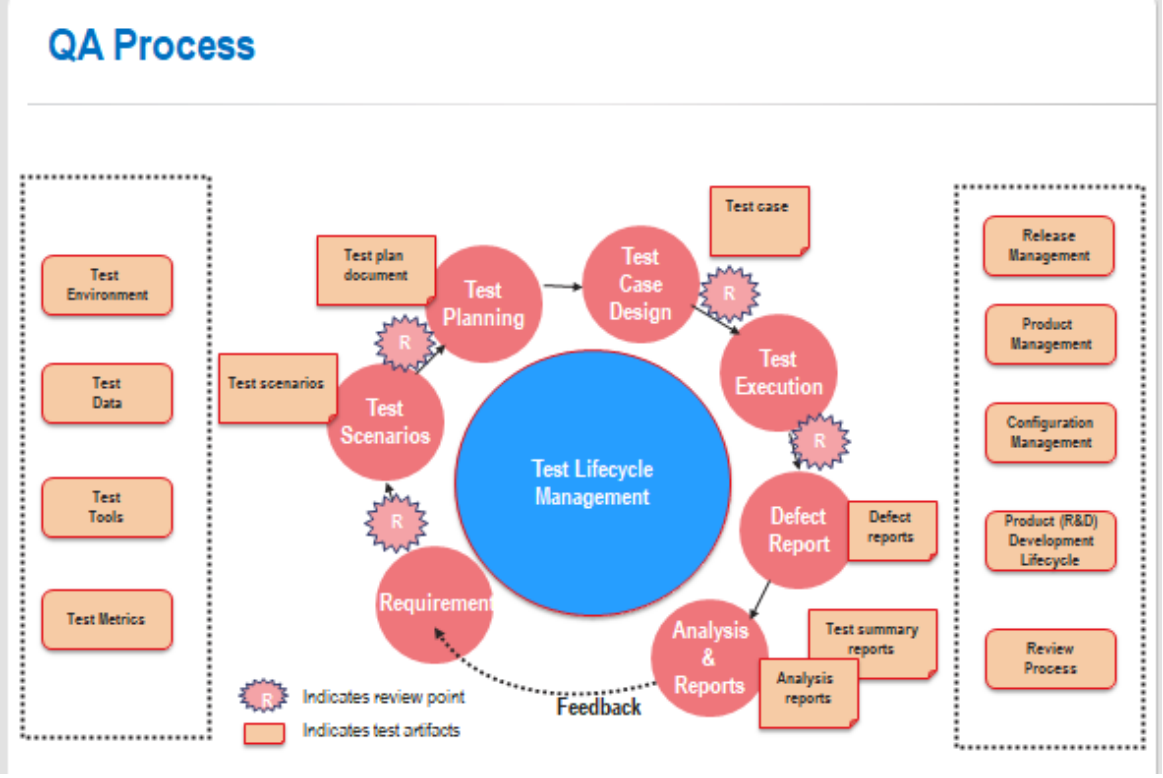
- Create BOM (bill of materials) for each build
- BOM will consist of the following
- Jar file for each microservice
- Zip file for React
- Zip file for Django
- Create database tables to store each build and the associated BOM
- BOM should be represented via JSON
- Once the build is done the build model should be populated
- Deployment should take a build as input and based on the BOM perform the build
- For each component the build number will be the version number as per the versioning strategy
- What should the version number be for the overall build?
- Integrate Maven into the build
- Maven will pull out the version of each component for a build

CI/CD pipeline:

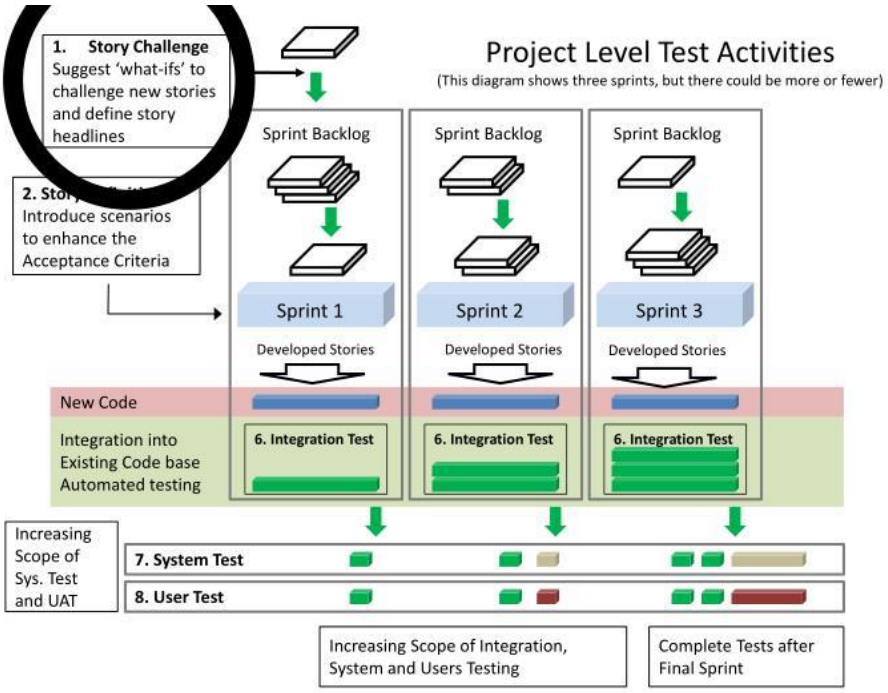




Product QA (Testing):



Test Strategy For the Releases:



Conclusion

Sales and Operations Platform bridges the gap between demand and supply, by creating a collaborative and consensus driven forecasting and planning process that incorporates market intelligence. This solution also fosters S & OP collaboration with contract manufacturing organizations and channel partners and its powerful Rough Cut Capacity Planning (RCCP) and Inventory Planning solutions enable optimal scenario analysis and supply-demand integration.

Supply chain management can improve financial performance; lead to satisfied customers; reduce delivery times; and build trust, confidence and commitment among suppliers. However, integrating supply chains to achieve expected benefits is a key strategic challenge since managers operate in a complex, turbulent and highly competitive environment in which quick response to customer needs and flexibility are vital for firm survival and success. Therefore, even if every firm would like to integrate its supply chain with others, the decision to integrate supply chain and achieve the resulting benefits is influenced several factors. These factors include: management attitude to risk; the firm’s size, resources and targeted market; the firm’s geographical location ;the firm’s customers, suppliers and competitors; and the firm’s structure.