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**Mission To Provide People With
Opportunities to Build a Better Future**

Welcome to the World of Continuous
Improvement

Business Analyst
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Chapter 1
BA- IIBA
Introduction



30,000
Members in
160 Countries



1500
Volunteers



120
Chapters in
40 Countries



500
Partners

<https://www.iiba.org/>

Since 20 Years

BoK – Body of Knowledge - **BABoK V3**

Entry Certificate in Business Analysis (ECBA)

Certification of Capability in Business Analysis (CCBA)

Certified Business Analysis Professional (CBAP)

Agile Analysis Certification (IIBA-AAC)

Certificate in Product Ownership Analysis (IIBA-CPOA)

BABoK V3

Six Knowledge Areas

1. Business Analysis Planning & Monitoring.
2. Elicitation and Collaboration.
3. Requirement Life Cycle Management.
4. Strategy Analysis
5. Requirement Analysis and Design Definition
6. Solution Evaluation.

And

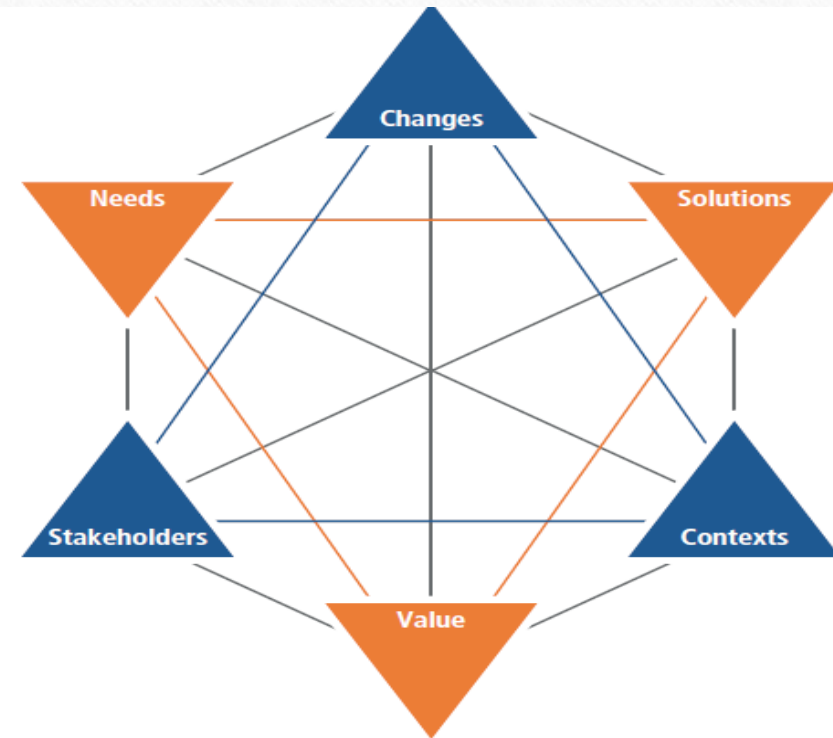
Underlying Competencies.

Techniques

Perspectives.

BABoK V3 - BACCM - (Business Analysis Core Concept Model)

- Change
- Need
- Solution
- Stakeholder
- Value and
- Context



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Chapter 1
BA- IIBA
Introduction

Pathvista HR Consultancy Company is into Staffing, Recruitment and HR Consulting. This Company has 50 resources working. Core Activity of the company is to provide Skilled Resources to their 100+ Clients on various Verticals and Skill set. Clients release JD – Job Descriptions of their HR Requirements to the Company. Company Recruiters work on the JD, pool in the candidates and send resumes to the Client. Client will shortlist candidates and schedule interviews. Company Recruiters will co-ordinate with the shortlisted candidates and send them to interviews and take feed back from client as well as from the candidate. Client pays to the company based on the engagement time of the company recruiters on Client requirement. Presently all recruiters fill in timesheets in excel sheets. Multiple recruiters work on one JD. Client will have multiple JDs. Please analyze on how Company Accounts officer will prepare Bills for the Clients for every fortnight. Assume that 20 Clients gave 46 requirements and 35 Recruiters worked on them in the fortnight. Each Day, 1 recruiter will submit 1 Timesheet. For 2 Weeks, 35 Recruiters submit 350 Timesheets. Company Accounts officer must assess these 350 timesheets and prepare Bills Client wise and JD – Requirement wise. To prepare these Bills it is taking 5 Working Days and after submitting the bills, the Client after verification is releasing bill Amounts in a Week days' time. We must reduce this TAT- Turn Around Time. What you will suggest?

BABoK V3 - BACCM - (Business Analysis Core Concept Model)

Change The act of transformation in response to a need. Change works to improve the performance of an enterprise.

Need A problem or opportunity to be addressed. Needs can cause changes by motivating stakeholders to act.

Solution A specific way of satisfying one or more needs in a context.

Stakeholder A group or individual with a relationship to the change, the need, or the solution.

Value The worth, importance, or usefulness of something to a stakeholder within a context.

Context The circumstances that influence, are influenced by, and provide understanding of the change.

TIMESHEETS AUTOMATION – HR CONSULTANCY

Change – This change refers to the fact that a Solution implementation may need a mindset change of employees as they will shift from excel sheet entry to Application entry to an automated system

Need – The need to Automate the timesheets from Excel sheets

Solution – Implementing timesheets application

Stakeholders – Recruiters, Company Accounts officer

Value – By implementing this Automated Timesheets application, Business can look forward to decrease the TAT time of the payment process and more accurate n efficient process with less errors.

Context – here we require application development rather than a COTS product as this very specialized process. Similar Need of another organization which follows standard process may prefer COTS product

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BABoK V3- BA Definition - 5 Perspectives

Business Analysis

Series of Change enabling activities

Business Analyst – Change Enabler

Business Analysis – 5 Perspectives

- Information Technology
- Agile
- Business Process Management
- Business Architecture
- Business Intelligence

IT BA - As a BA we enable change in a process through IT application. That IT Application is developed through Traditional methodologies like waterfall and its variants

Agile BA - As a BA we enable change in a process through IT application. That IT Application is developed through Agile methodologies like DSDM, Kanban, XP, Scrum

BPM BA - As a BA we work in a process and enable (part of) the change in a process for the betterment of the process

Bus Arch BA - In our Company – New Vertical – All Resources are new – Start Operations – They face Challenges – to address – refine the process in order to make it a stable process

Bus Intell BA - Every Company – Managers – at some levels- Decisions – Reports – access to Data

What Data – What Reports generate – what Decisions – Data Analysis

BA Introduction - BA Responsibilities

IT Company
Client – IT Applications
Business
Business Process - IT
Market Trends - IT n
IT Enabled applications

IT Company
Technical Team
Technology

In IT Company - BA
Client - Business Language
Technical Team – Technical
~~NOT Technology~~ – Language
Diagrams, Docs

BA Responsibilities
1. Client Interactions
2. Ownership of Requirements
3. Process Re-engineering

Transfer Funds – Bank , ATM,
Internet B , Mobile Banking

HMS – In-Patient, Out-Patient
Banking – Customer, NRI, Privileged

BA – Open to work on projects
Any Domain , Any Technology
Domain – Functional Consultant
Domain Expert -SME ,
Domain n Technology –
Techno-Functional Consultant

ATM – Application - Client – Initiative
Cardless Cash
Bio-metric device -Retina Scan
Device scan – Digital Patterns

Contributions of BA in Projects - IT Company - PM - BA

Gather Requirements → Elicitation techniques

**Document Requirements → Standards IEEE
CMMi, Comp Spec**

Model Requirements → UML

Communicate Requirements → Tech Team

Design

Dev

Test

Track Requirements – RTM

Handle CR – Change Requests

Facilitate UAT

3C – Correct Complete Consistent

**IEEE – Institute of Electrical and
Electronics Engineers**

**CMMi - Capability Maturity
Model Integration**

UML - Unified Modelling Language

Walkthrough Meetings

KTs – Knowledge Transfer Sessions

**RTM – Requirements Traceability
Matrix**

UAT – User Acceptance Testing

BA Document Names

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**Chapter 1
BA
Introduction**

- | | |
|--|--|
| 1. Request for Proposal (RFP) | 18. Solution Document |
| 2. Request for Information (RFI) | 19. High Level Design Document (HDD) |
| 3. Request for Quotation (RFQ) | 20. Application Design Document (ADD) |
| 4. Business Case | 21. Low level Design Document (LDD) |
| 5. Statement of Work (SOW) | 22. Component Design Document (CDD) |
| 6. Stakeholders Document | 23. Use case Description Document - Use case Specs |
| 7. Kick off Meeting Report (KOM) | 24. Change Tracker (CT) |
| 8. Software Development Plan (Tasks and Resources) | 25. Change Request Log |
| 9. Project Plan (using MPP) | 26. Status Reporting |
| 10. Quality Plan | 27. Checklists |
| 11. Business Requirement Document (BRD) | 28. Test Strategy |
| 12. User Requirement Document (URD) | 29. Test Plan |
| 13. Functional Requirement Specification (FRS) | 30. Test Case Document - Test Scripts |
| 14. Supplementary Specification Document (SSD) | 31. Client Acceptance Form |
| 15. Software Requirement Specification (SRS) | 32. Project Closure Document |
| 16. Requirements Traceability Matrix (RTM) | 33. Fit for Support Document |
| 17. Functional Requirement Document (FRD) | 34. User Manuals |

Requirements Intro

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Requirements - 4 Types - Docs - How BA handles Requirements

Requirements – Need of the Client

Example - Retail Store – Billing Solution

BRD 1. Business Requirements

Accept Payments

As a BA , we will gather Business Requirements and Stakeholder Requirements and we will prepare Functional Requirements

URD 2. Stakeholder Requirements
User Requirements

Accept Payments

By Cash

By Card

By Wallets

SRS 3. Solution Requirements

FS/FRS 3.1. Functional Requirements

SSD 3.2. Non-Functional Requirements

Integration of external peripherals + Quality Req

Accept Payments

☐ By Cash

☐ By Card

☐ By Wallets

Please swipe the card
on the Swipe Machine

Bill Amount - Rs 350
Customer gave - Rs 500
Return Change - Rs 150

ADD 4. Transition Requirements

1 Time – Temporary Requirements

Installations Deployments Trainings

Requirement will have 2 parts
Data n Functionality

Functional Vs Non- Functional Requirements understanding

	Functional Requirements	Non-Functional Requirements
Objective	What the Product Does?	How the Product works
Focus	on User Requirement	User Expectations
Documentation	Captured in Use Case	Captured in Quality Attribute
Essentiality	Mandatory	Not Mandatory, but desirable
End Result	Define Product Features	Define Product Properties
Origin Type	Usually Defined by User	Usually defined by developers or other Technical Experts
Types	External interface, Authentication, Authorization Levels, Business Rules	Usability, Reliability, Scalability, Performance

Case Study - Business Requirements , Functional Requirements

OP Consultation & Billing Project

This Hospital has 10 Departments in OP Consultation

All departments work from 9am till 1pm and 4pm till 8pm – 7 days a week

Each Department will have minimum 4 Doctors for consultation

Any patient can request for appointment with any doctor

For each Appointment, doctor slot of 10 minutes will be booked

Doctors prescribe medicines and tests

Medicines are available at Pharmacy

Tests are done at Lab

All Consultations, medicine, lab test bills are payable at respective counters

Please make the project flexible, configurable and receptive for future changes

identify Business Requirements, Functional Requirements

Guidelines to add Flexibility

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Introduction

Convert all Numbers to Variables - add Flexibility, Configurability, Soft Coding

This Hospital has 10 Departments in OP Consultation	This Hospital have multiple Departments, as of now 10 Departments- in future it may increase or decrease
All departments work from 9am till 1pm and 4pm till 8pm – 7 days a week	Departments work in slots – as of now , we have 2 slots – 9am till 1pm and 4pm till 8pm – Slots are mapped with day of a week or day of a month – new slots may be added or old slots may be deleted
Each Department will have minimum 4 Doctors for consultation	Departments will have minimum number of Doctors – as of now - 4 Doctors – in future, it may increase or decrease
Any patient can request for appointment with any doctor	
For each Appointment, doctor slot of 10 minutes will be booked	Doctor appointment will be for 10 minutes – Here we have to allot 6 patients for one hour time slot
Medicines are available at Pharmacy	
Tests are done at Lab	
All Consultations, medicine, lab test bills are payable at respective counters	

Identify - Business Requirements

Every Business Requirements will have Requirement id <Proj ID><BR ID>

PQ786BR0001 Patient should be able to book an appointment with the Doctor for a given Slot

PQ786BR0002 Doctor should be able to enter his/her availability for Consultation to the Slots

PQ786BR0003 Reception should be able to collect Consultation fees from the patients

PQ786BR0004 Pharmacy should be able to give prescribed medicines and collect the medicine costs

PQ786BR0005 Lab In-charges should be able to conduct lab test prescribed and should be able to give lab reports and collect lab test charges

Identify - Functional Requirements

Functional Requirements are from Systems Perspective and each Functional Requirement will have an ID <Proj ID> <FR ID> , Each Unique Noun n Verb will be (few) functional Requirements

PQ786BR0001 Patient should be able to book an appointment with the Doctor for a given Slot

Nouns – Patients, Doctors, Slots, Verbs – Book an appointment

PQ786FR0001 Patient Registration Process

PQ786FR0002 Doctor should be enrolled with the hospital

PQ786FR0003 Slots should be defined

PQ786FR0004 Doctor availability should be mapped to slots

Stakeholders - 3 Types

A “stakeholder” is any person or a group of Persons or an organization that is directly or indirectly effected or impacted by the proposed IT Solution.

1 PROJECT STAKEHOLDERS - IT

Project Manager
Business Analyst
Developers , Testers
Delivery Managers, DBA

2. BUSINESS STAKEHOLDERS Client

3. 3rd PARTY STAKEHOLDERS

External Consultants
COTS , MOTS

Negative Stakeholders

Client - Business Stakeholders

Identify
Decision Makers
Influencers

Core Team

Sponsor - initiate PROJECT
release funds

SPOC - single point of Contact - 60 to 70 % BA

LM/RM - Process Experts, Owners, SME
Subject Matter Expert

Team leads - Ambassador Users

Team Members - End Users

As per *BABOK® Guide*,
stakeholders roles are

- business analyst,
- customer,
- domain subject matter expert,
- end user,
- implementation subject matter expert,
- operational support,
- project manager,
- regulator,
- sponsor,
- supplier, and
- tester.

BPM Introduction

We understand Concepts using
Measures and Metrics

Another City
Based on distance

Buy some milk
Based on Quantity

Which House you live in

Kms
Meters
Sq Meters

2BHK
3BHK
Pent House
Duplex House
Villa
Apartment

If Direct Measures and Metrics
are not available
Then we use a model

To understand Client
Business Process
We use BPM
Business Process Model

BPM - Business Process Model

A business process:

1. Has a Goal – **Profit / Quality / Support**
2. Has specific inputs
3. Has specific outputs
4. Uses resources
5. Has a number of activities that are performed in some order
6. Creates value of some kind for the customer.
The customer may be internal or external.

Int - Ext

Bank

Employees - Customers

Domain - Yes - No

Process - Yes - No

Training - yes - No

User Friendly Applications

BPM - Case study - Sugarcane Juice wala

1. Goal – Profit
2. Inputs – Sugarcanes, Disposable Serving glasses,
3. Outputs - Specs – Fresh Sugarcane Juice
4. Uses resources – Crushing machine, re-usable serving glasses, utensils, Persons working, Power, Place
5. Activities that are performed in some order – Order of Customer , Prepare Juice, Serve Juice, Collect Amount
6. Value for the customer – Quenching the thirst

Please work on
BPM - ATM

Value in generic – Customer Satisfaction

Value in IT – User Friendliness

BPM - Case study - ATM

1. Goal –Support Process
2. Inputs – Data on Card, Transaction Type Inputs, Relevant Transaction data Inputs
3. Outputs - Based on Transaction Inputs
4. Uses resources – ATM, Card, Environment – Network, power n so on
5. Activities that are performed in some order –Based on transaction selected
6. Value for the customer –Any Time n Nearby

BPM - Case study - Guidelines - Practice Case Studies

Always consider the base service for simplicity
Only value created is from end user (customer) perspective,
rest all (Goal, inputs, Resources, Output, activities) are from
business owner perspective

Ola app

Goal

To bridge the gap between the cab service operator and the
customer

Inputs

Location of car n customer

Start point n destination point, rate card applicable, payment mode

Resources

Mobile app of the customer and car operator, server application at
Ola office, internet,

Output

Trip agreed with terms,

Trip done and amount paid by agreed payment mode, Trip details
saved in servers

Please work on BPM for below
Case studies

1. Oyo
2. Ola app
3. Swiggy app
4. Dunzo app
5. Amazon
6. Any one bank mobile app
7. PayTM app
8. Whatsapp
9. Irctc app
10. Bookmyshow

8 Skill Areas

- | | | |
|--|--|---|
| 1. BA Directives – Real Time Experience of successful BAs | How many Bas in a project
Do-s Don'ts , Thumb-rules | Methodologies
Sequential
Iterative
Evolutionary
Agile |
| 2. BA Competencies Negotiations, problem solving, | | |
| 3. SDLC Models – Waterfall , V, RUP, Spiral, Agile & Scrum | | |
| 4. Functional Skills – BPM, Domain Model | Documentation Tools - MS Office,
UML Drawing Tools - MS Visio, | |
| 5. Technical Skills – OOA, UML | Prototyping Tools - Axure, Balsamiq, | |
| 6. Requirements Engineering | Agile Task Management Tools - JIRA, | |
| 7. Tools and Documents | Reporting Tools - Power BI, Tableau,
And basics of SQL | Approaches in IT
✓ Traditional Waterfall
✓ Agile Scrum |
| 8. BA Strategy | BRD, FS, FRS, SRS, RTM -> Hands-on
Work on Projects - Nurturing Process | |

IT Companies Types

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**Chapter 2
BA
Directives**

Product Development IT Companies	Application Development IT Companies
Microsoft , Oracle, IBM, SAP	Infosys, TCS, Wipro, Tech-Mahindra
IT Company will have the concept and they invest time and money to build the product	Client will have a requirement and will engage an IT Company to develop an IT application
IT Company initiates the development	Client initiates the development
IT Company is the owner of the developed Product	Client is the owner of the developed application
IT Company will sell the same product to multiple Clients or Customers	Client will be the only customer for this application
Customizations are done if required for each customer	
Installation will be done at the Clients place	Deployment will be done at the Clients place
Business Analyst Role	
Understand the product features	Understand the Client Industry
Understand the product Domain	Understand the Client requirements domain
Understand where this product fits in the Domain	
Understand the Client's requirement	
Understand what customizations are required for this product to fit in the Client's requirements	

Business Analyst(BA) VS Research Analyst(RA) Product Manager/Owner

1. BA will have a finite set of stakeholders, whereas RA does not have
2. BA will get requirements from the stakeholders, whereas RA will do market research to get the requirements
3. BA will analyze the requirements and work on them, whereas RA will do innovative thinking and have to come up with creative ideas to finalize the requirements.

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Chapter 2
BA
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IT Company gets a project

Client -Need

1. Process Re-engg
2. 3rd Party Consult

Publish RFP

RFI - Cut Off Date

Client - Conduct Pre-Bid Conference

PPT , Q&A

RFQ - Cut Off Date

Client - 1. Technical, 2. Financial verify

Shortlist 5 IT Companies - Negotiations

Client - SOW - IT Company

IT Project - Efforts - Manhours

Milestones - Weeks

% of BA in Project

Team Size - 12 to 16%

100 -16

50 - 8

25 - 4

12 - 2

10 -15-- 2 or 3BAs

Duration - 15%

1 year Project - 2 months

Project

Metrics

Man Hours

or

Person Hours

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Directives

Projects - Budget

2 types

1. Fixed Bid Projects
Given Functionality -
time n Budget is fixed
Domestic Projects

2. Billing Projects
bill the Client
per Resource/Hr
Overseas Projects

Timesheets

8hrswork/day

1 hr - Discussion with Client

2 Hrs - Documenting the discussions

2 Hrs - Clarifying the tech team

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Chapter 2
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Directives

Audits

inspection of work for
Quality and for progress
Std-

As a BA we are responsible
to update the progress of the
project to the responsible
stakeholders and concerning
documents

Mail Communication

Documents updates

5 incidents - Project

5W 1 H – Tool of a BA

If we need extract consistent Requirements
then probe in these directions like

Where, why, what, who, when and How.

5W 1H is considered as tool of a BA.

Gantt Chart

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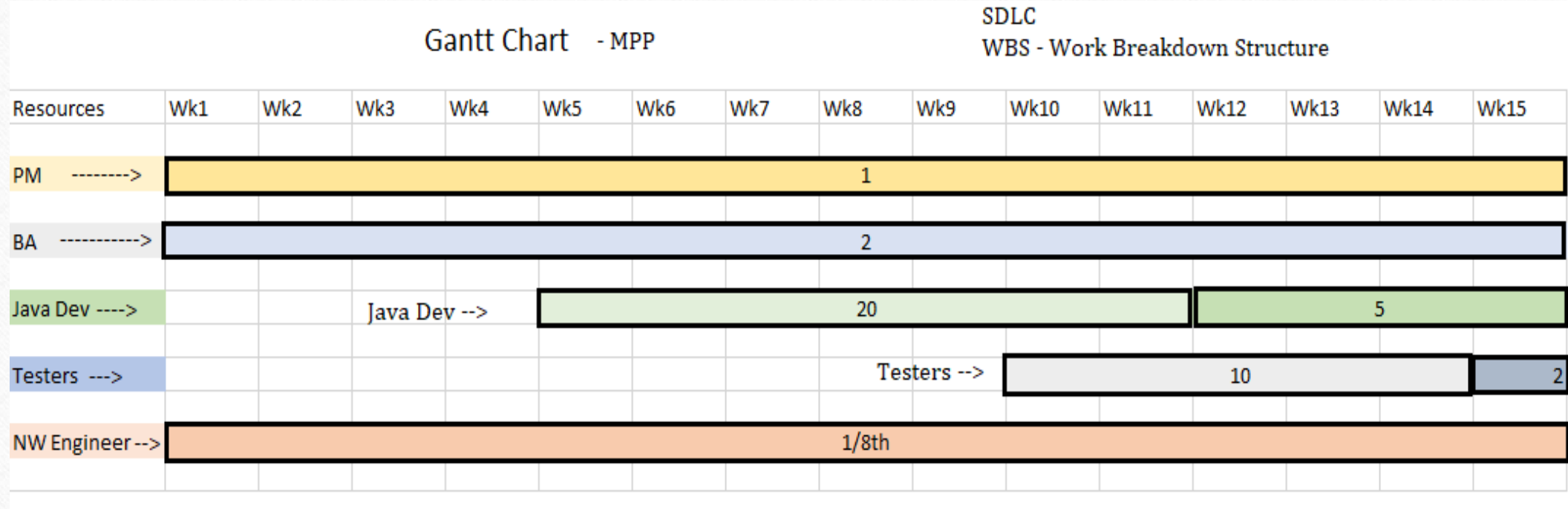


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Chapter 2
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Gantt Chart



Document Naming Stds - Scope Creep

Document Naming Stds

ProjID-Doc Name- V[]- D[].ext

PQ786-BRD-V1-D1.docx 1.1.

PQ786-BRD-V1-D2.docx 1.2.

PQ786-BRD-V1-D3.docx 1.3.

PQ786-BRD-V2-D1.docx 2.1.

1 yr Proj - 20 CR

3 month - 100 CR - NO

Scope creep

Reasons for Project Failures

- Improper requirement gathering - **BA**
- Continuous change in requirements - **Client, BA**
- Lack of user involvement - **Client**
- Lack of executive support - **HR, Support, Admin**
- Unrealistic expectations - **Client, Pre-sales**
- Improper planning - **PM**

Company Standards

BA works in
IT n IT Enabled Companies

➤ **ISO**

➤ **CMM**

✓ CMM -3

✓ CMM-5

✓ CMM –I

IEEE

Process, Documents Stds

Risk Analysis

Risk can be **an event** which can **slow down the progress** of the Project and sometimes **cause a failure**

Risk can also be viewed as the **GAP** between the **Perfect work** and **our work**.

➤ Risk Identification

As a BA, we have 2 Risks

❑ BA Risks

BA tasks not doing correctly

❑ Process Risks in Projects

Where it can go wrong in process

➤ Risk Assessment

➤ Risk Rating

➤ Risk Appetite

➤ Risk Mitigation Policy

Risk Analysis - case study - Identify BA Risks, Process Risks

OP consultation n Billing Project

This Hospital has 10 Departments in OP consultation
All depts works from 9am till 12noon and 4pm till 8pm - 7days/week
Each dept will have min 4 doctors for consultation
Any patient can request for appointment with any doctor.
For each appointment, doctor slot of 10 mins will be booked.
Doctors prescribe medicines and tests
Medicines are available in Pharmacy
Tests are done at lab
All consultation, medicine, tests bills are payable at respective counters.

Risk Analysis - case study - BA Risks - Process Risks

Risks

BA Risks

Project Domain
Experience of BA
Gather Req - understanding
Document Req - properly - not complete
Model Req - UML
Comm Req - Right Audience
Good Team Mgmt Skills
Change in Req
Track Req

Process Risks

Project Risks

OP Consultation n Billing Project

Doctor appointment is fixed and the Doctor did not turn up that day...
then????

Patient made payment and payment not reflecting in the appointment ...
then???

Patient did not come at the given appointment
then..???

BA - Thumbrules

Rule : Office starts at 10am

boundary of operations

Thumbrule : reach office atleast 15 min before(9:45am)

safe zone

1. Solve the Client Problem only by our IT Solution
2. Be like a lotus in the mud
3. Never take Tensions, but pass on the tensions
4. Requirements hurried - Project hurried
5. Never criticize any Stakeholder and always appreciate even for their small efforts

Situation -1

Your IT Company got a project from the Client.

The Client has 10 divisions and you have gathered Requirements.

After sorting the Requirements, you have observed that 4 divisions have common requirements.

85% are different requirements and 15% are common requirements.

4 Divisional Managers are very much stubborn not to have a common design features.

How do you handle them as a BA to make them all agree to the same design?

Situation 1 - Solution

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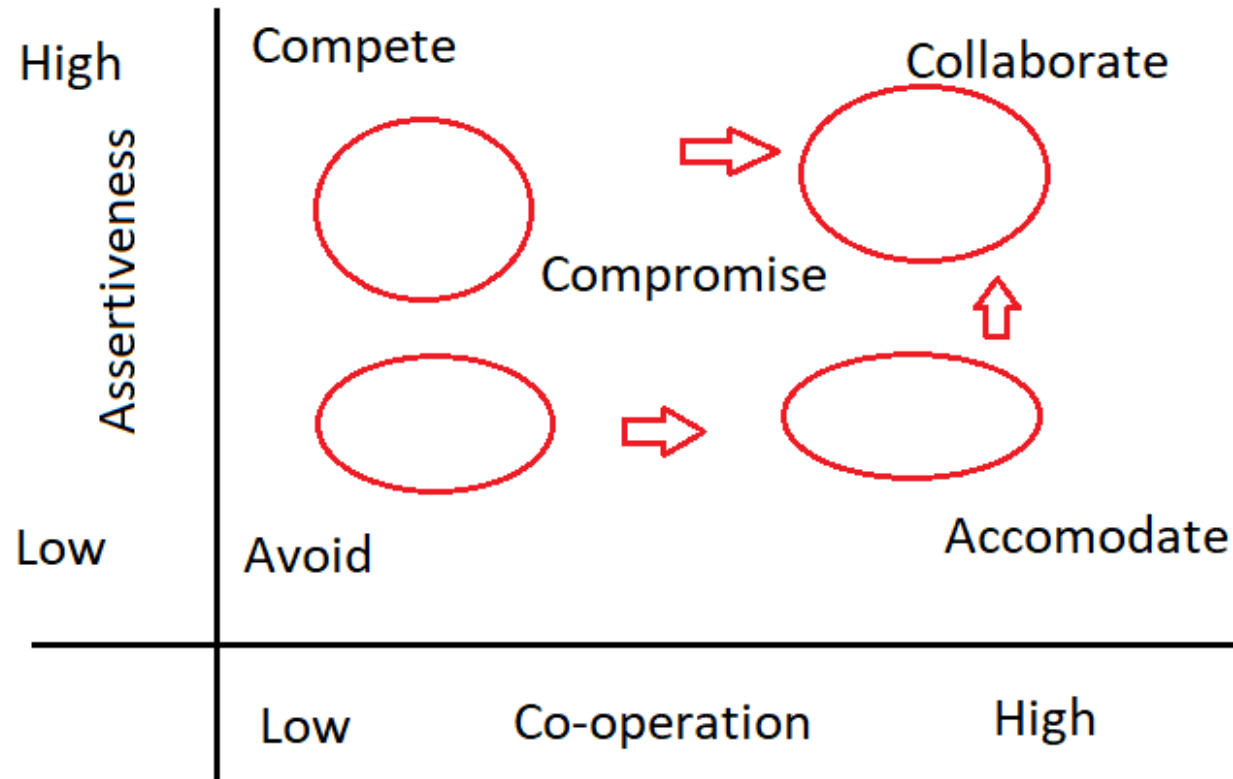


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Chapter 2
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Technique - Thomas Kilmann Conflict Resolution Graph



Situation - 2

A project was received 9 months ago from Motorola(Client); the duration of the project is 12 months, which is now in testing phase. At that time there are two players Motorola and Nokia in the mobile market. Exactly at that time, Nokia released a mobile in the market which belongs to the same segment. Nokia's mobile has 100 more features than our present Motorola Mobile model. Motorola contributes to 85% revenue to the IT Company. Meanwhile, Client called to give 200 more requirements which should be included in the same application without any extension on Budget or time. As a BA, how will you take on this?

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Scope Creep

Zero Budget Time - Low Budget Time

Client - shares req - email attachment word or PDF

call n confirm - All imp emails - followed up - phone call

Ack email - 1. thank 2. confirm 200 req 3. 2 days time- respond

all email -cc- PM

3more months - PM inputs

5 more Months - Client - email - call n confirm

Cushion Time - 2 months

Desk phone ring -

Negotiations -4 months

Situation - 2 - Important Notes

- Important Mails are followed up by a phone call
- All Mails should be Acknowledged
- All project mails will be copied to the Project Manager
- Decisions will be taken by Project Manager and Business Analyst should follow them
- If any Resources are involved in discussion of a mail, then copy that mail to that Resource as well
- At work bay, mobiles – smart phones will not be allowed – data sensitive projects – then team will be using desk phones to communicate with stakeholders and other locations team members

Dos & Don'ts as a BA

- Always use **5W1H** for probing into any concept
- **Never say NO to Client** – Always listen in your first meetings and if you have to say NO – come with proper reasons – why it is not possible
- Banned word for BA is "**I KNOW**"
- There is NO word called as "**BY DEFAULT**"
- Never imagine anything in terms of GUI – Graphical User Interface – **Page designs – Screens**
- Question the existence of existence

IIBA approach

As a BA

Inputs –
Requirements

Outputs –
Diagrams - usecases,
Activity Diagrams,
flowcharts,

BA Challenges

- Lack of training
- Obtaining sign-off on requirements
- Change Management – with respect to cost and timelines
- Coordination between developers and testers
- Conducting Meetings – **IT works on Consulting mode**
- Making sure status reporting is effective
- Driving clients for UAT completion
- People Management (coordinating with different people and different teams)
- Overall making sure project health is in good shape and delivered as per the time-lines without any issues.

BA Competencies -Business Communication

3w Rule of Communication

What

Who

When

Types of Business Communications

Verbal and Non-Verbal

Verbal

Oral Communication

Written Communication

Non-Verbal

Facial Expressions

Gestures

Eye Gaze

Appearance

Thomas Kilmann Conflict Resolution

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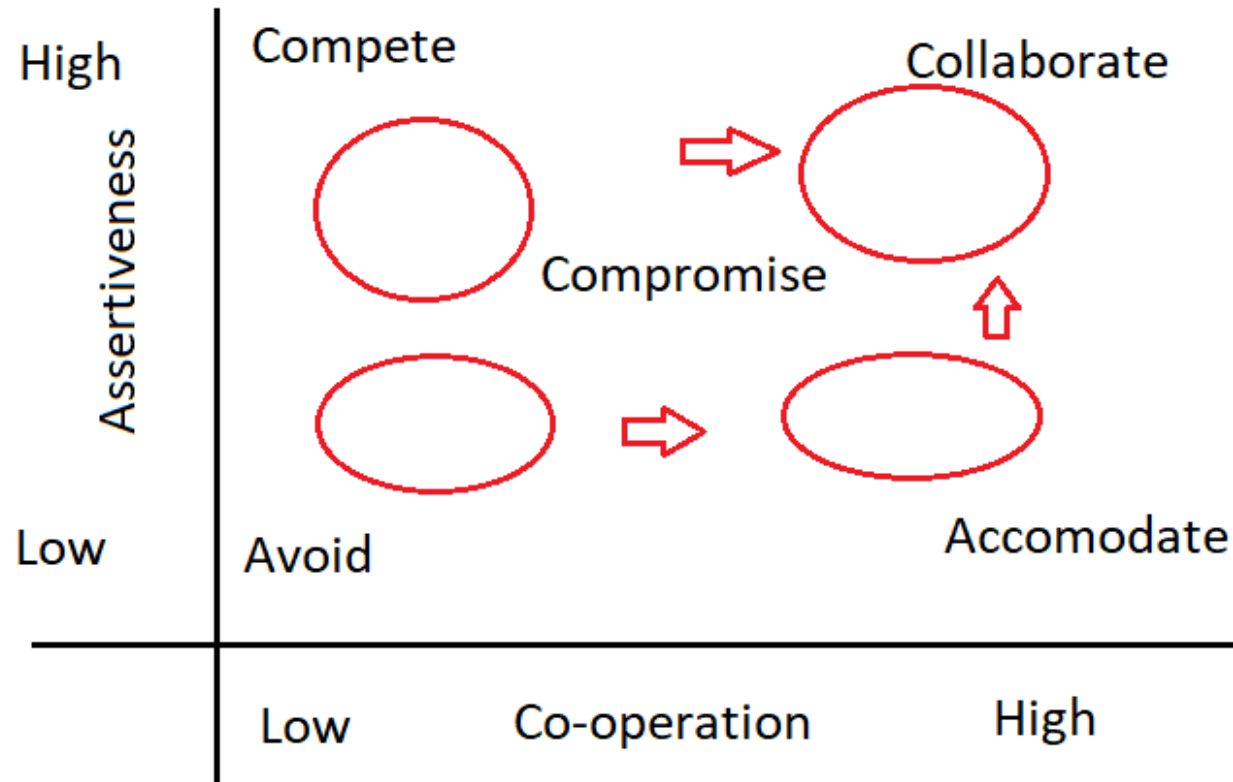


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Chapter 3
BA
Competenci
es

Technique - Thomas Kilmann Conflict Resolution Graph



SDLC - Methodologies n Models

Methodologies

Set of Guidelines

Constitution

Models

Follows the guidelines and achieve
the functionality

Government

4 Methodologies (Project – 5 yrs duration)

- **Sequential** - the entire project is delivered at the end of the complete duration – 5yrs
- **Iterative** - project is delivered in modules with some frequency
- **Evolutionary** - the project framework is signed off first and then functionalities are added
- **Agile** – it is continuous delivery of executable software from 2 weeks to 2 months

SDLC - Methodologies

5 years Project						
	2025	2026	2027	2028	2029	2030
Sequential						
Iterative						
Evolutionary						
Agile						

Waterfall Model

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**Chapter 4
SDLC**

Stages of Waterfall Model	Resources	Artifacts
Requirements gathering	BA, PM	BRD
Requirements Analysis	BA, PM Tech Team – Sol Arch, NW Arch, DB Arch	FS/ FRS, SSD, SRS RTM
Design	Tech Team – Sol Arch, NW Arch, DB Arch, GUI Designer	HDD / ADD Solution Document
Development – coding	Programmers Developers	LDD /CDD Application
Testing	Testers	Test Documents Application with less Errors
Unit, Component, System, System Integration, UAT		
PROCESS - Configuration Management - PM		
Deployment & Implementation	Release Engineers	

Waterfall - continuation

Req Analysis

- | | | |
|-----------|-----------------------------------|----------|
| BA | - prepare Functional Req | - FS/FRS |
| Tech Team | - prepare Non- Functional Req | - SSD |
| BA | - add FS and SSD to form SRS | |
| BA | - take Signoff from Client on SRS | |
| BA | - prepare RTM referring SRS | |

ADD Vs Solution Doc

ADD - Design in a single flow - Text Book
Solution Doc - Same Design organised as individual Req and Solution - Guide

Programmers Vs Developers
Programmers - Only Technology
Developers - Both Technology n Domain

Test Documents
Test Strategy
Test Plan
Test Schedule
Test Cases

Servers

IT Perspective
3 Servers

Development
IT Company

UAT

Client

Production

Client

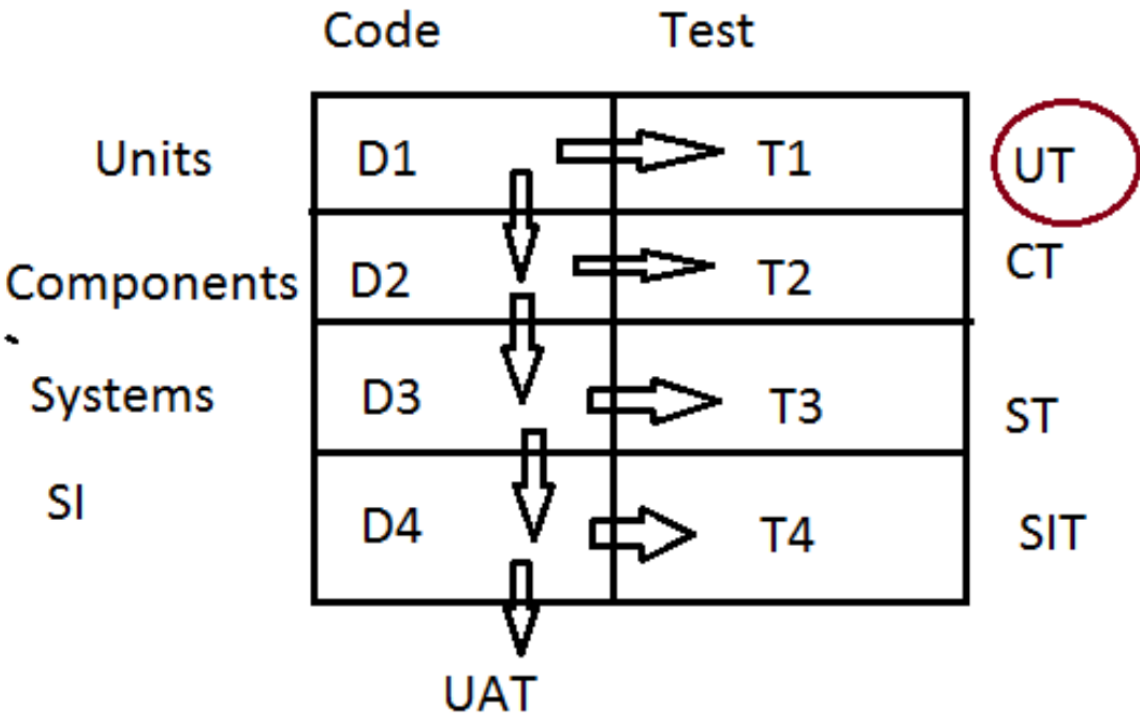
Deployment – moving Code from Development Environment to Production
Implementation – running the code for the very first time in Production
After Implementation, maintenance stage starts and Support Team will take care.

Development Server

PQ786				
Public	Protected	Code	Test	DB
Documents		Technology		

Magnified View

V Model



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Chapter 4
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RUP

**Rational
Unified
Process**

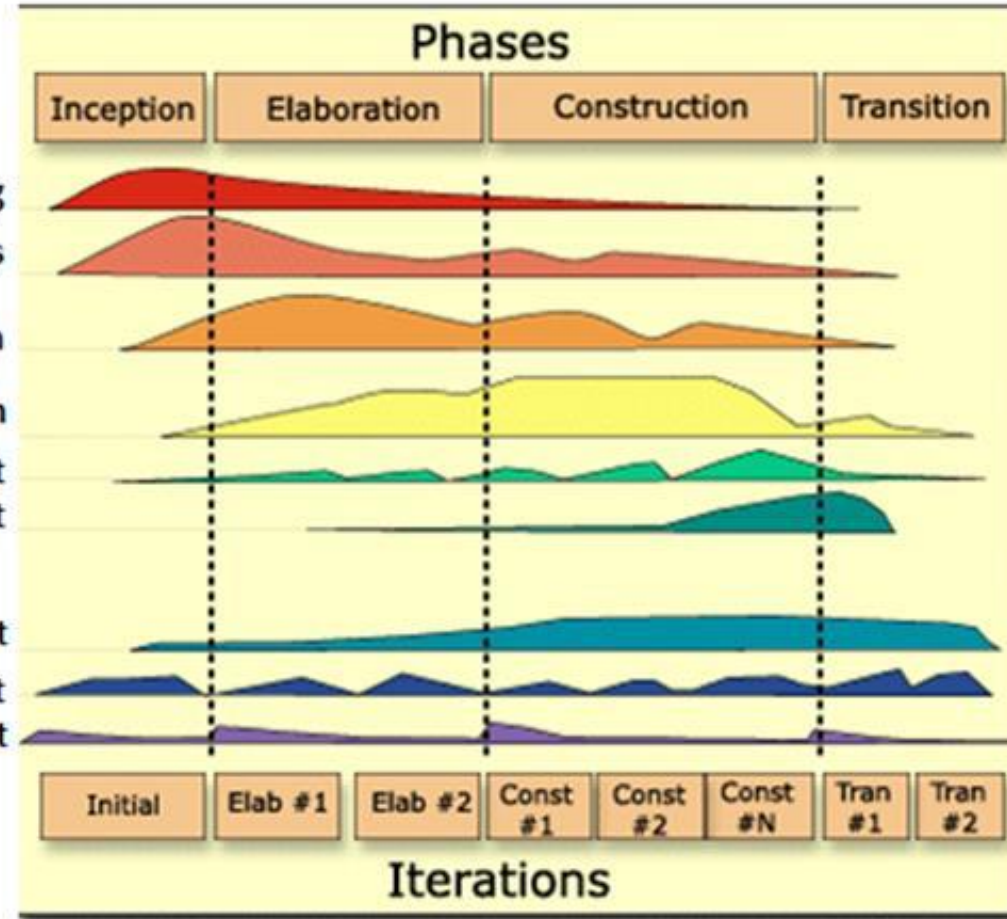
BA role in
Projects

Core Process Work Flow

Business Modeling
Requirements
Analysis & Design
Implementation
Test
Deployment

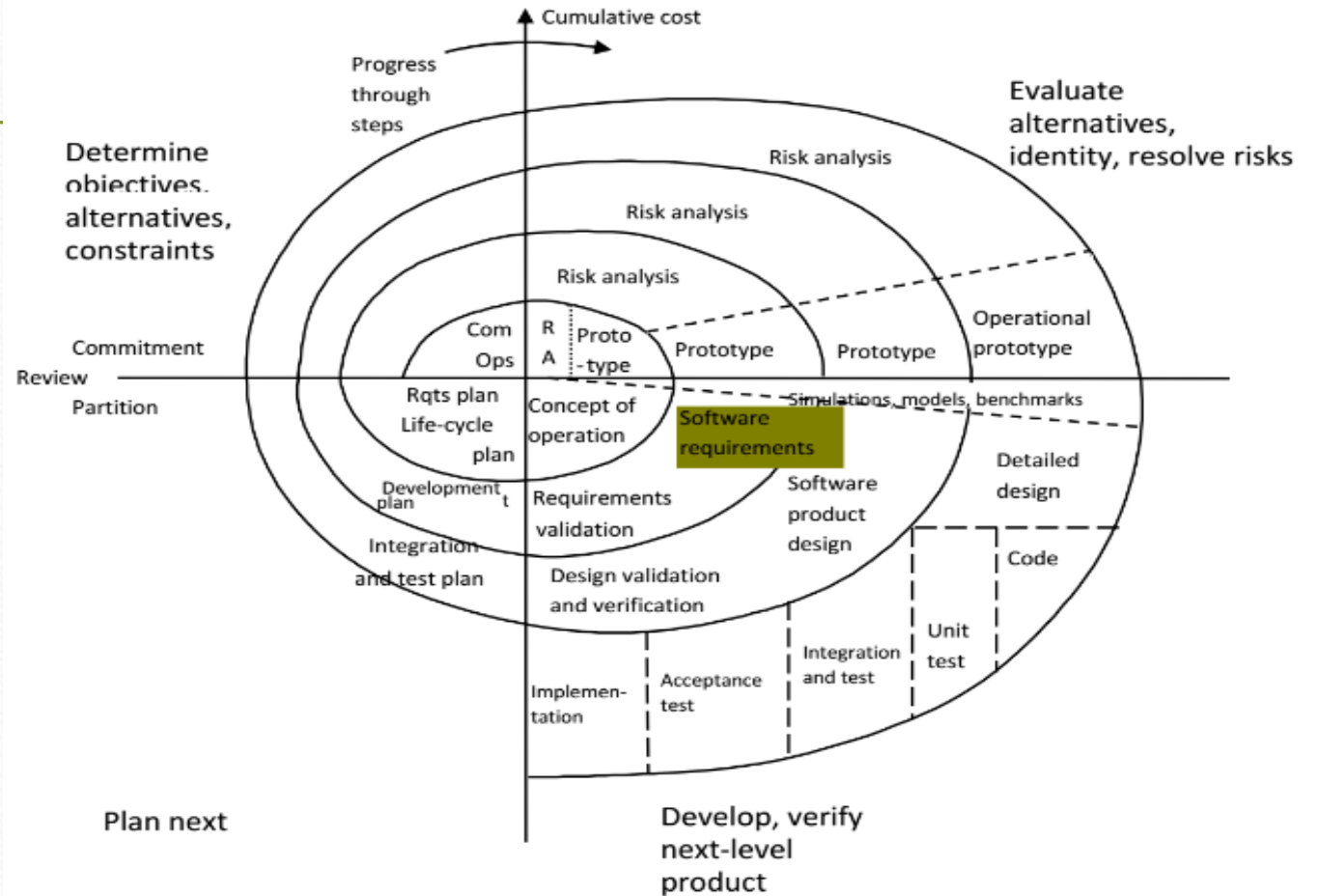
Core Supporting Work Flow

Configuration & Change Management
Project Management
Environment



Spiral Model

Evolutionary – Spiral

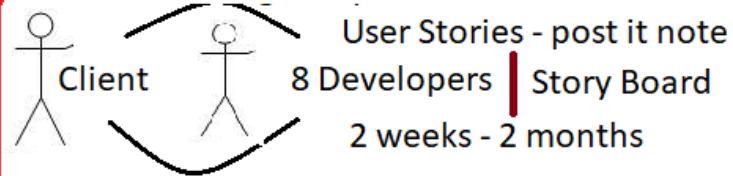


Agile Introduction

Agile

Delivery time is high

Handle Change Requests



No Middlemen

Only with Developers

No Documentation

Working SW is a proof of functionality

Low Cost

Quick Deliverables

CR is posted as a User Story

Agile architecture - smartphone

Freshers - NO
Experienced, Skilled,
Honest, Self organising,
Comitted, Motivated,
Quick Learner, Continous
Learning n improvement,

Individuals
interactions

Process
Tools

Customer Collaboration
Open to Change

Agreement
Plan

face to Face interactions
Playing a GAME to WIN
Back logs
Clarity

Agile Manifesto -1

Four main Values

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

Twelve Principles of Agile Software

1. Satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

Agile Manifesto -2

6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhances agility.
10. Simplicity--the art of maximizing the amount of work not done--is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Scrum Framework

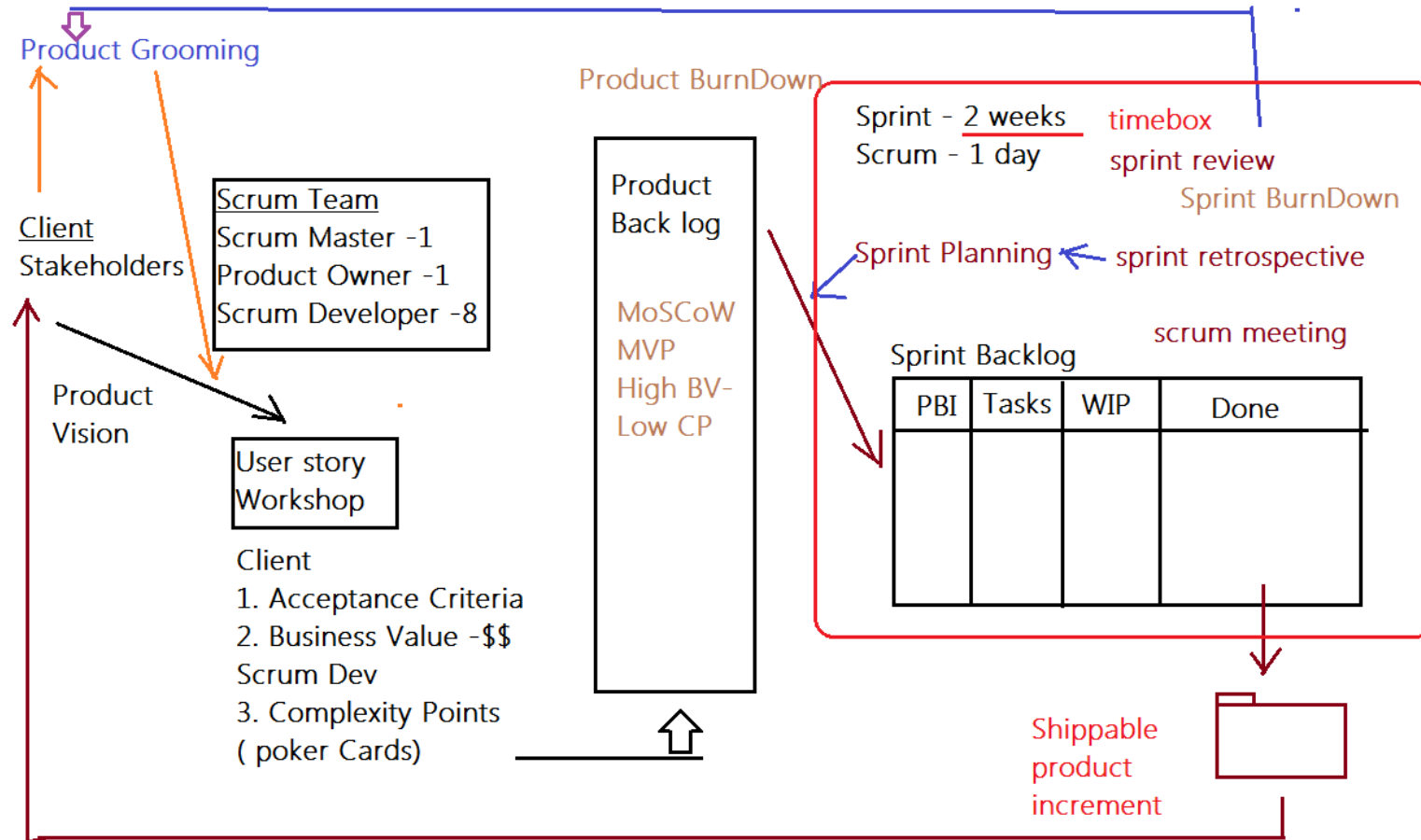
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E-Card Project

User Stories

BV Estimations

CP Estimations

Tasks – Standup Meetings

Burn Down Charts

Conclusion

Product Vision

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Vision

What is your vision, your overarching goal for creating the product?



Target group

Which market segment does the product address?

Who are the target users and customers?



Needs

What problem does the product solve?

Which benefit does it provide?



Product

What product is it?

What makes it desirable and special?

Is it feasible to develop the product?



Value

How is the product going to benefit the company?

What are the business goals?

What is the business model?

Product Vision Example1

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**Chapter 4
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Vision: Our vision is to develop a cutting-edge payroll application that revolutionizes how organizations manage their payroll processes. We aim to create a seamless and intuitive platform that automates payroll calculations, ensures compliance with tax regulations, provides real-time insights into financial data, and enhances employee satisfaction by delivering accurate and timely payments.

Target group	Needs	Product	Value
Which market segment does the product address? SMEs (Small and Medium-sized Enterprises), Large enterprises, Industry specific solutions (Health care, Retail, manufacturing etc.), Startups, small businesses, Integrated HR	What problem does the product solve? Manual Errors, Compliance issues, Time consuming processes, Inaccurate reporting, lack of employee self service, Data security risks, Limited scalability	What product is it? This software tool is designed to automate and manage the process of paying employees within an organization. It encompasses various functionalities related to employee compensation, tax calculations, benefits administration, reporting, and compliance with regulatory requirements.	How is the product going to benefit the company? This EMS payroll application product benefits the company by improving accuracy, efficiency, compliance, cost savings, data security, employee satisfaction, decision-making capabilities, integration, and scalability. It enhances payroll processes, reduces administrative burden, and contributes to overall organizational success.

Product Vision Example2

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Target group	Needs	Product	Value
Who are the target users and customers? HR Managers, Payroll administrators, Finance professionals, accountants, Managers, Supervisors, auditors, financial institutions	Which benefit does it provide? Automated calculations thereby reducing human errors, increases efficiency, ensures compliance with different rules and regulations, cost savings, data security, Employee self service, reporting and analytics Scrum Framework	What makes it desirable and special? User friendly interface, customization, Automated calculations thereby reducing human errors, increases efficiency, ensures compliance with different rules and regulations, cost savings, data security, Employee self service, reporting and analytics	What are the business goals? EMS payroll application can contribute significantly to enhancing payroll operations, optimizing resources, ensuring compliance, improving data security, empowering employees, and facilitating informed decision-making within the organization. What is the business model? EMS Payroll's business model focuses on providing reliable, accurate, and compliant payroll processing services along with additional benefits administration and compliance management, all while offering scalable solutions and integration capabilities to meet the diverse needs of their clients.

Scrum project
e-Cart

1. Login
2. Product Catalog
3. Add to Cart
4. Payment
5. Delivery Tracker
6. Customer Satisfaction

eg:

Backside of the Userstory or
postit note - Responsible
stakeholders will write
Acceptance Criteria

User Stories will have below Information:

As a
<User>
I Want to
<What is the Purpose>
So that
<What you gain by this story>

US	Module	Priority
As a Customer I want to Login to the net banking site So that I can perform banking activities		
BV:		CP:

Users

1. Business Owners
2. Admin
3. Customer
4. Vendors

minimum 3 Userstories
in each feature
and send it

Scrum Framework

User Stories

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"As an Admin ,
i Want the login screen to display the right error messages in case of failure ,
So that the end user gets to know the accurate reason for failure and also helps during addressing the issue."

"As a Customer
I want an option to view Product calatlog
so that
I can choose from available options"

"As a Business Owner
I want to capture Customer feedback
so that
I can measure the customer satisfaction of the product/service"

"As a Vendor
I want to place my products in the catalog
so that customer can buy my product"

**Please write atleast 100 user stories
following the syntax**

Acceptance Criteria
will be written by responsible stakeholders
on the backside of the user story - (take
Use case Spec as base)

Scrum Framework

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Scrum Project - e-cart - BV Estimation-1



Scrum Project - e-cart - BV Estimation -2

[Scrum](#) Framework

Invested 20 Lakhs each in this e-Cart project - Business Owners							
BV - Business Value is NOT the cost of investment, NOT the cost of development and NOT the complexity of achieving - How important is this feature for you as a Business Owner							
Name	Login	Product Catalog	Add to Cart	Payment	Delivery Tracker	Customer Satisfaction	
1 Business Owner 1	100	20	10	500	50	200	880
2 Business Owner 2	200	100	10	50	20	500	880
3 Business Owner 3 and so... on	10	50	20	100	200	500	880
TOTAL	780	820	120	2300	650	3200	
RANKING	4	3	6	2	5	1	
	50	100	10	200	20	500	

Scrum Project - e-cart



Scrum Project - e-cart - CP Estimations

[Scrum](#) Framework

Complexity Points - Story Points - Poker Cards -

Scrum Developer

How much efforts are required to develop this feature

? 1 2 3 5 8 13 20 40 100 BIG

200

max value - 100

fabnocii series - with minimum Cards you can express max values

Total value cannot exceed 200

Name	Login	Product Catalog	Add to Cart	Payment	Delivery Tracker	Customer Satisfaction	Total points
1 Rashmi Scrum Developer 1	20	60	20	40	20	40	200
2 Rohit Rao Scrum Developer 2	10	60	10	20	20	80	200
3 Krishna Scrum Developer 3	10	100	10	10	20	50	200
4 saikumar Scrum Developer 4	40	100	7	40	8	5	200
5 Venkatesh Scrum Developer 5	10	100	10	20	10	50	200
6 Gopaal Krishna Scrum Developer 6	40	60	30	20	20	30	200

Scrum Project - e-cart - Sprint - Tasks - Daily scrum

[Scrum](#) Framework

Task - Unit of Work done by 1 Developer in 1 Scrum Day

8 Dev - 10 Working days(2 weeks)

1 day - all meeting

8 Dev - 9 Working days

Tasks - $8 \times 9 = 72$ Tasks

Divide 'n' User Stories into 72 Tasks

--

Day 1 ,

10am - Each Dev - pick 1 Task from Tasks Column- write his name on that Task -keep this Task in WIP column

Go back to his seat n work on that Task

7pm - Dev will come for Stand Up Meeting

1. What did you do today?

2. Tomorrow what you will work on

3. Any Challenges or When you complete User Story

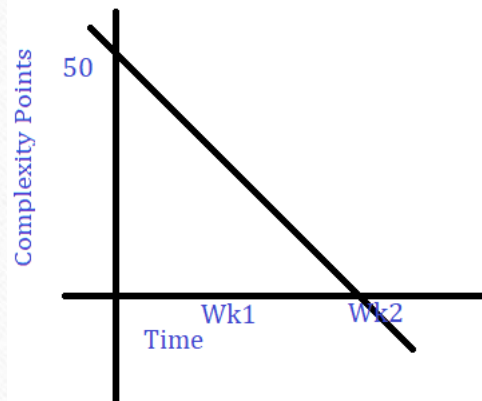
Once that Task is Completed - Dev will move that Task from WIP Column to Done Column

Sprint Backlog

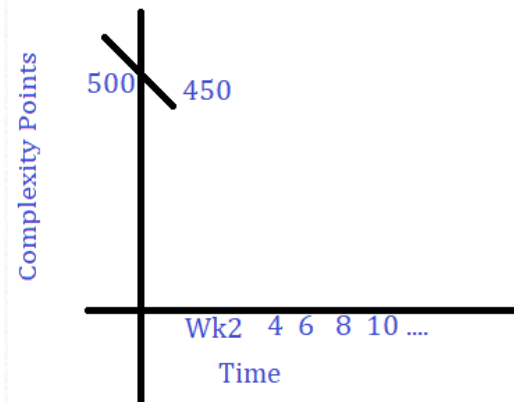
PBI	Tasks	WIP	Done

Scrum Project - e-cart - Sprint Meetings - Burn Down Charts

Sprint BurnDown Chart



Product BurnDown Chart



[Scrum](#) Framework

Agile Scrum - Realistic picture

Project - SDLC

Client - IT Dept - SDLC

No methodology nor Model is
followed in the purest form

Project - Iterative - Module wise
For that First Module

Waterfall Model - RG, RA, Design

BRD - FS - SRS - Design Documents

Code , Test -- Agile/ Scrum

Scrum - Certifications

Scrum Master
Product Owner

OOA – IT Application Components

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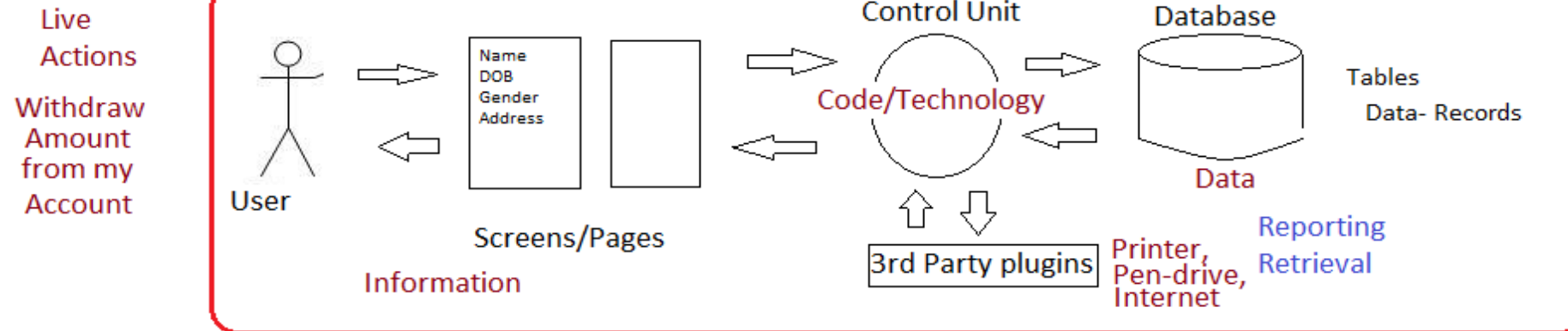
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IT Application

Components of an IT Application



Functionality of an IT Application
= Business Logic achieved by technology
or Code + Data in the Database

Servers

Database Sample

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Table

Expenses
Table Name

SI No	Date	Time	Expense Name	Amount	Balance
1	29-Mar-20	10am	Book	100	900
2	29-Mar-20	10am	Pen	50	850

Entities

Data Records

All Tables + Entities = DB Schema

DB Schema + ER Diagrams
= DB Design

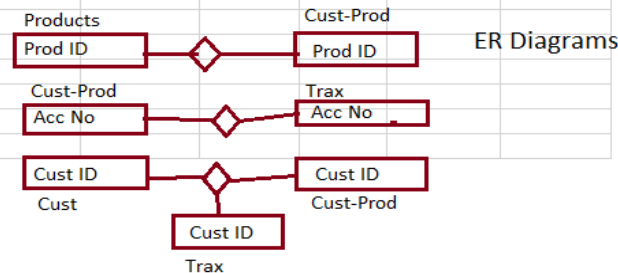
Bank DB

Prod ID	Prod Name	Category	DOI	Remarks
SAV001	Savings	SAV		
SAVS02	SAL Savings	SAV		
LOA003	Personal Loan	LOAN		
LOA004	2w Loan	LOAN		

Cust ID	Cust Name	DOB	PAN	Contact

Acc No	Cust ID	Prod ID	DOS	Remarks

Tras ID	Acc No	Cust ID	Amount	Plus/minus	Balance



API Data-mapping Copy Books Objects

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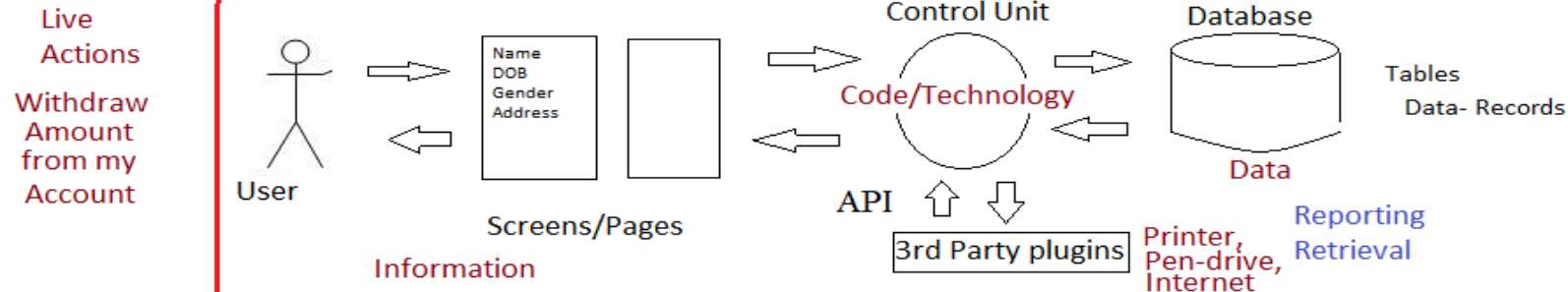
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IT Application

Components of an IT Application



Real-Time Items
Petrol
Deisel
Water
Milk
Wheat
Car
Scooter

Tagged
Properties
of these
Items

Camel
casing

OBJECT - Car

Identity	Regd Number
State - Attributes - Values	
Color - RED	
Pass Cap - 4	
PTS - 10 liters	
Behaviour- Actions- Methods	
turnLeftAndThenRight();	
accelerateAndIncreaseSpeed();	
refillFuelFiveLiters();	

OOA

Object Oriented Approach

Table in DB

CAR			
Identity	Color	Pass- cap	PTS
Regd Number	RED	4	10

Data Mapping

Copy Books

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APIs - Governing Bodies Standards

API – Application Programming Interface

Example

India date DDMMYYYY

US date MMDDYYYY

Conversion of file format from US to
India or vice versa is done through API

Standards of any governing bodies...

How they propose...

It's the file format ... they give

Copybooks

KYC is different for
Bank - mobile banking
Ola
Swiggy
PayTM

As those business requires different information

OOA - Class , Class relationships

Collection of similar Objects is a Class
Object can be an instance of the Class.

Class
State
Behavior

Types of Classes

Super Class

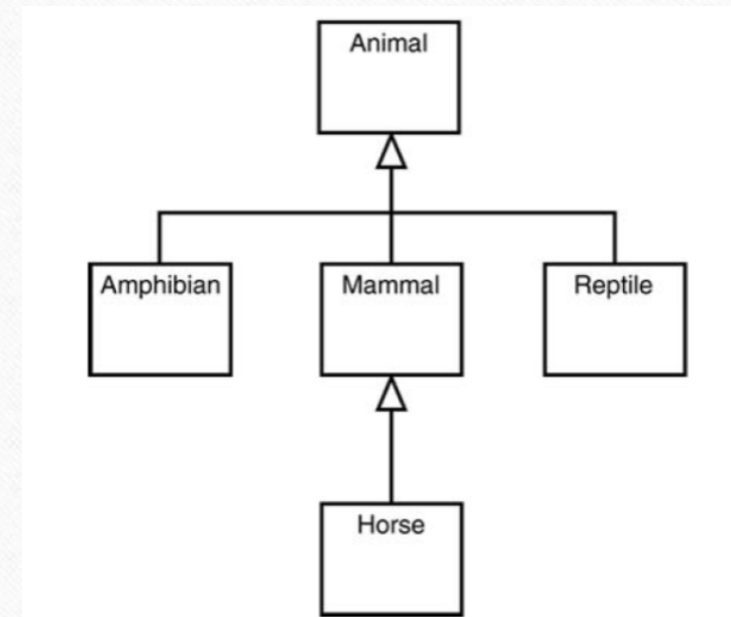
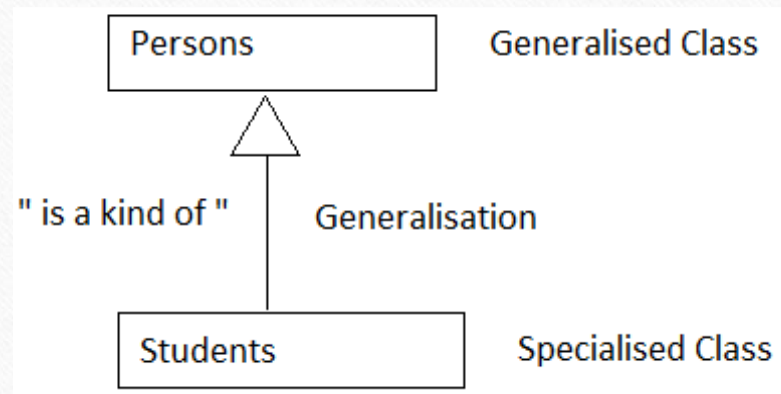
Sub Class

Parent Class

Child Class

Generalized Class

Specialized Class



Component Package Sub-system

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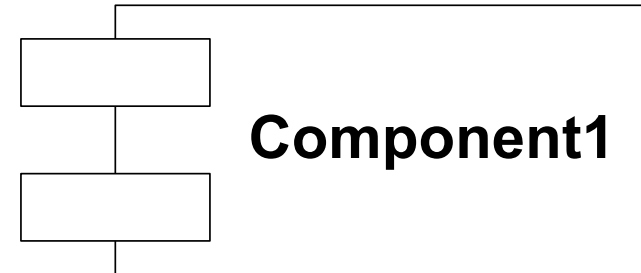
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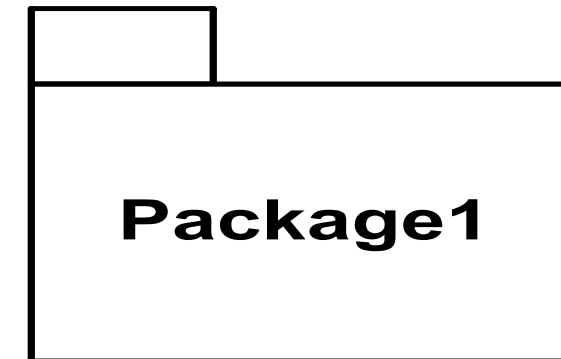
Component

Collection of Classes is Component.



Package

Collection of Components which are not reusable in nature



Subsystems

Collection of Components which are reusable in nature

Note:

Product Development Companies work on
Subsystems and Application Development Companies
work on Packages

Summary

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**5,6 Functional
Technical Skills**

English Language

OOA

Alphabets

Objects

Words

Classes

Sentences

Components

Paragraphs

Packages / Sub-Systems

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OOA - Implementing concepts of OOA

Abstraction

Considering what is required, ignoring what is not required.

Encapsulation

Information & Complexity hiding technique.

Inheritance

Child class inheriting the properties of Parent class.

Polymorphism

Single instruction, multiple operations.

Perito
80-20
20-80
Product - 20% features
main features - MVP
Minimum Viable Product
--
Gold Plating

Poly Morphism

Close -
Laptop
Book
Door

Encapsulation

Save the file - Filename
ASCII --
Hard-disk - Binary

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OOA - Relationships

**Relationships exist either between
Classes or Between Objects,
But not between a Class and an Object**

Maruti	Honda
Swift	Amaze

There are four types of relationships

- 1. Association**
- 2. Generalization**
- 3. Aggregation**
- 4. Composition**

Associations

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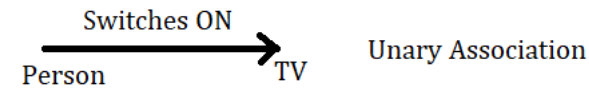
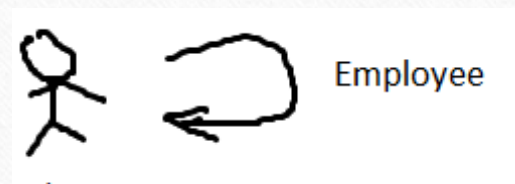
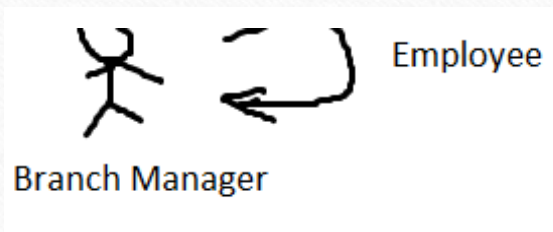
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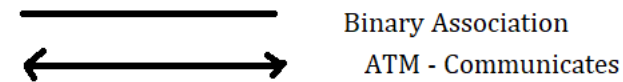
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OOA - Relationships - Associations

Association- has a relationship
Unary- One Way
Binary- Two Way
Multiplicity- 1 to Many, Many to 1 or Many to Many
Reflexive- Single class with multiple role & one role is directed to itself.



Unary Association



Binary Association

ATM - Communicates

Multiplicity- Association

1 --- m 1 Teacher - 10 Students

m --- 1 10 Students - 1 Class

m --- n 10 Students - 5 Subjects

OOA - Relationships - Aggregation Composition

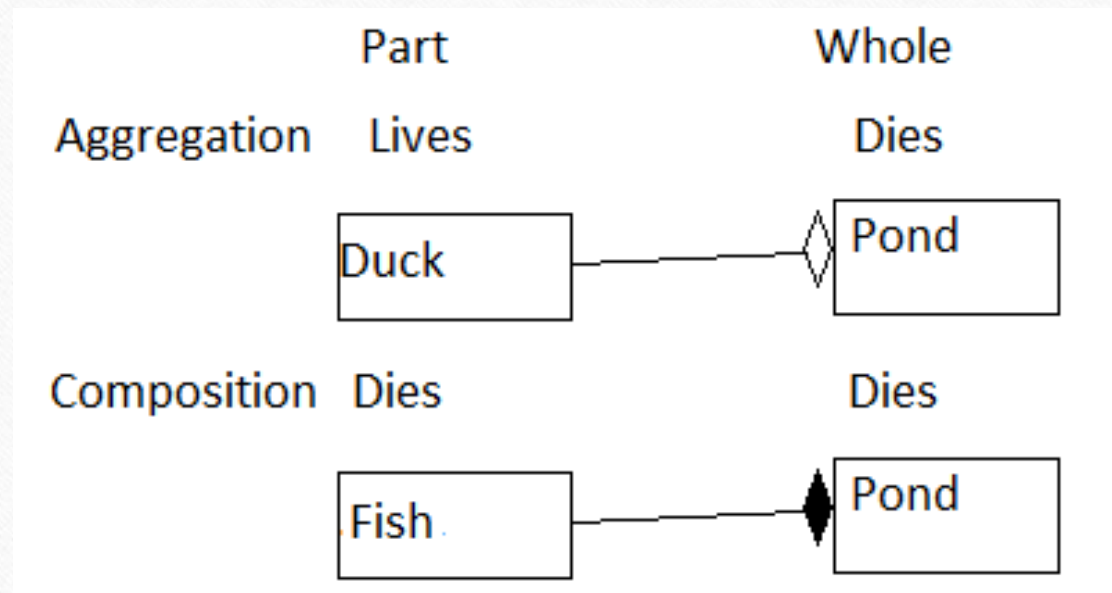
These Relationships exist
between Part and a Whole

Aggregation

The part remains even if the
whole dies

Composition

The part dies along with the
whole



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Classes are Basic Building blocks of Code

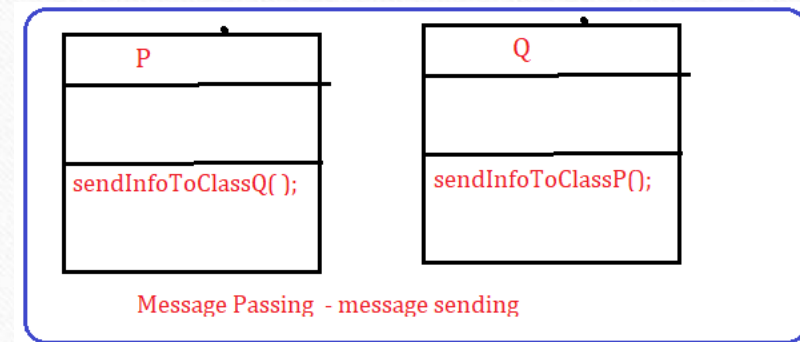
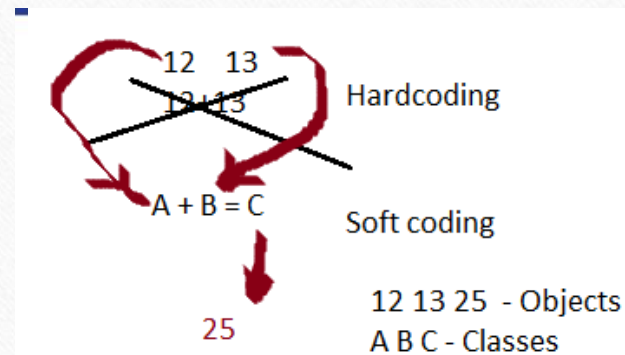
Achieve Functionality using Technology

Technology means we have to write Code

We write code using Classes and we pass Objects
through these Classes during Execution and
achieve the functionality

Internally, Classes will communicate with
each other -

Message Passing
Message Sending



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UML - Unified Modelling Language

UML is Known as Language of Diagrams

The Base of UML Diagrams is Object Oriented Approach (OOA)

UML has 9 Diagrams

5 Static

4 Dynamic

As a BA we draw 2 Diagrams

- **Use Case**
- **Activity**

5 Static Diagrams

- **Use Case**
- **Class**
- **Component**
- **Packages**
- **Deployment**

4 Dynamic Diagrams

- **Sequence**
- **Activity**
- **State-chart**
- **Collaboration**

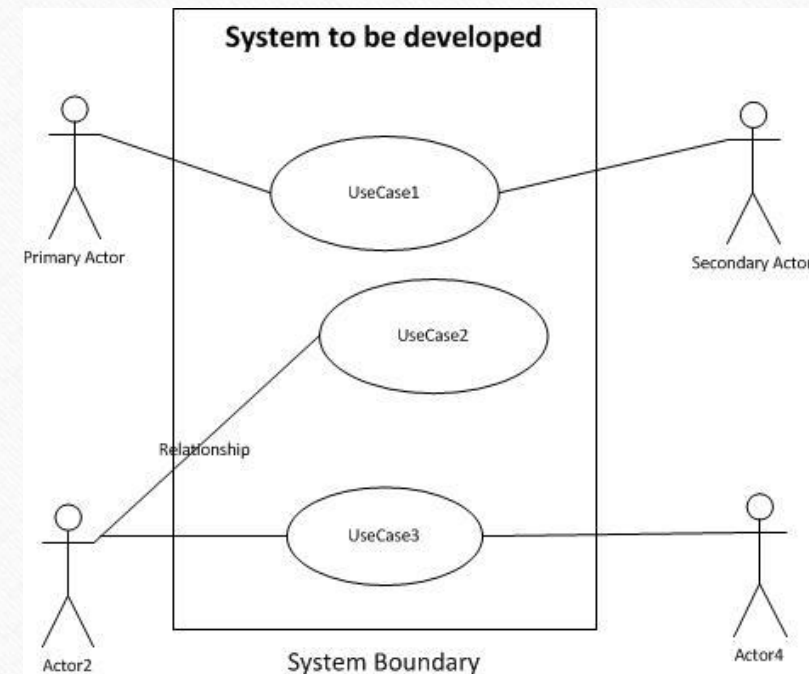
UML - Usecase Diagrams - introduction

- A Use case is a high level diagram.
- The main purpose of the diagram is to identify the requirement.
- A use case diagram is an actor specific.
- A use case diagrams are designed to explain how external users are interacting with the system.

Primary Actor directly interacts with the system

Secondary Actor supports the system with some Info

Binary Association is a relationship between actors and use case

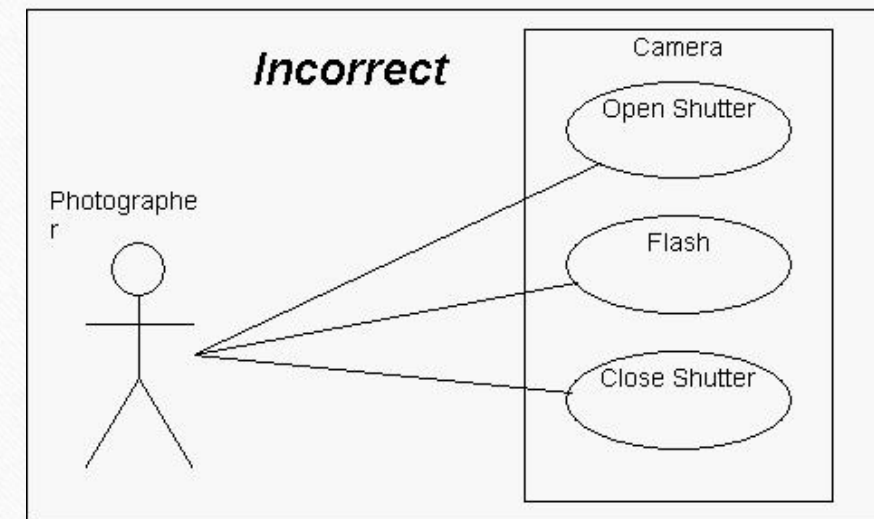
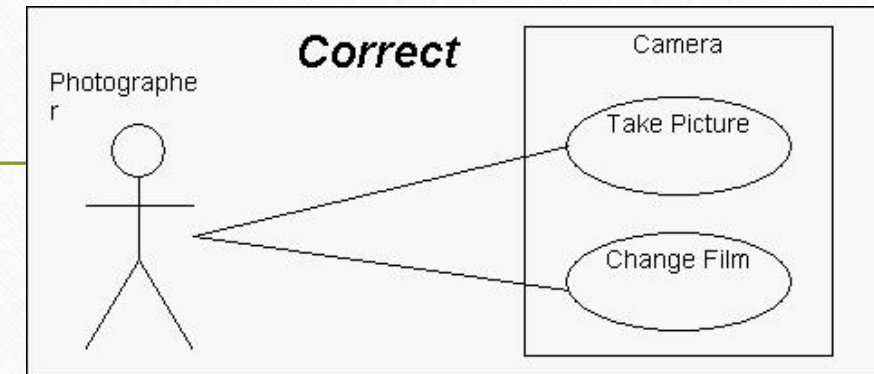


UML - Essential , Supporting Usecases

- Use cases are Verbs and are unique
- Actors are Nouns

Essential Use Cases—
makes sense and completeness
to the end user

Supporting Use Cases—
makes sense and
supports Essential Use case



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Essential Use Case

Book a Ticket - from Box office

--- Supporting Use cases

Payment

Ticket Copy

1. An Essential Usecase (EU) can be supported by Supporting Usecases (SU)
2. An Essential Usecase (EU) can support another Essential Usecase (EU).
3. Supporting Usecases (SU) can be supported by Supporting Usecases (SU)

irctc.co.in

railway reservation system

Primary Actors

Passengers

Agents

Secondary Actors

FCH

Bank

Printer

Online SMS Gateway

Mail Server

Essential UseCases

Check Availability

Book a Ticket

Cancel Ticket

Supporting UseCases

Book A Ticket

Login

Check Availability

Passenger Details

Payment

card
IB

Confirm Ticket

Printouts

SMS

e-mail

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UML -How to draw a Usecase Diagram -Guidelines

Before we draw our First Use Case Diagram

- **We are learning** – How to draw the diagram
- **Mindset** – given Case study – am I Understanding the diagram
- **Don't get into research mode** – what if I change this n that....

UML - Usecase Diagrams - How to draw a Usecase Diagram - 1

My Own ATM – Venkat's ATM

Customer

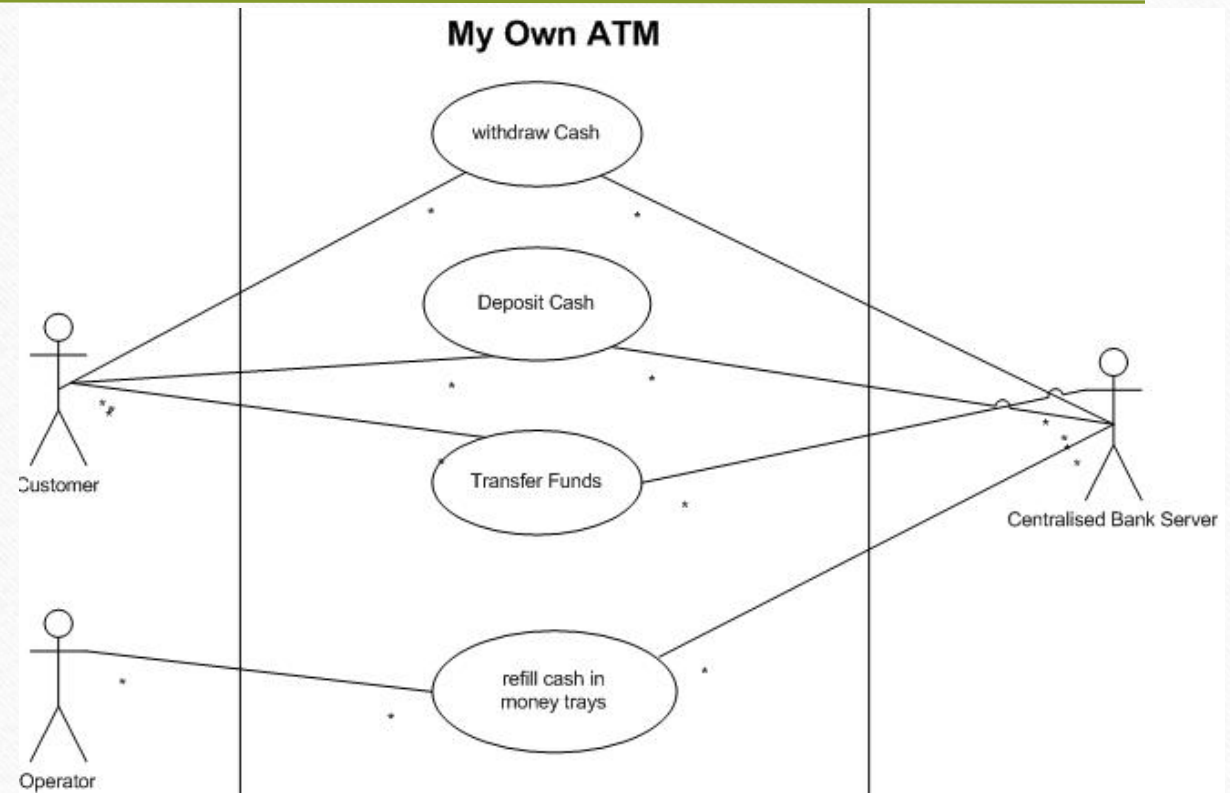
- Withdraw Cash
- Deposit Cash
- Transfer Funds

Operator

- Refill cash in money trays

Centralized Bank Server

All transactions are verified and upon approval, the transaction will be completed



UML - Usecase Diagrams - Generalisation

My Own ATM – Venkat's ATM

VIP Customer

➤ Order Cheque Book

VIP Customer **is a kind of** Customer

Generalization exist between
Customer and VIP Customer

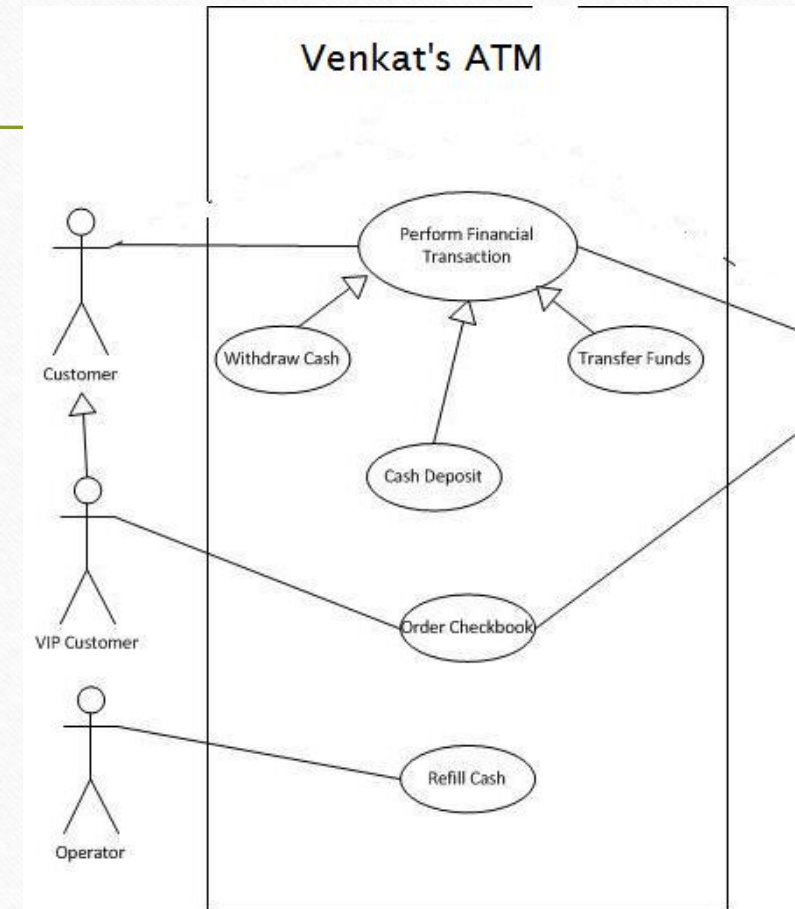
Actor Generalization
Use Case Generalization

- Withdraw Cash
- Deposit Cash
- Transfer funds

**Above transactions are all
Financial Transactions**

So we can generalize these transactions
to Financial Transactions

**Withdraw Cash is a kind of Financial
Transactions – Valid Statement
Then Generalization Exists**



Usecase Diagrams - Include Extend

My Account Balance is 5k
I want to Withdraw 7k
Can I Withdraw 7k ?

Withdraw Cash will check
Account **Available Balance**
before every Withdraw

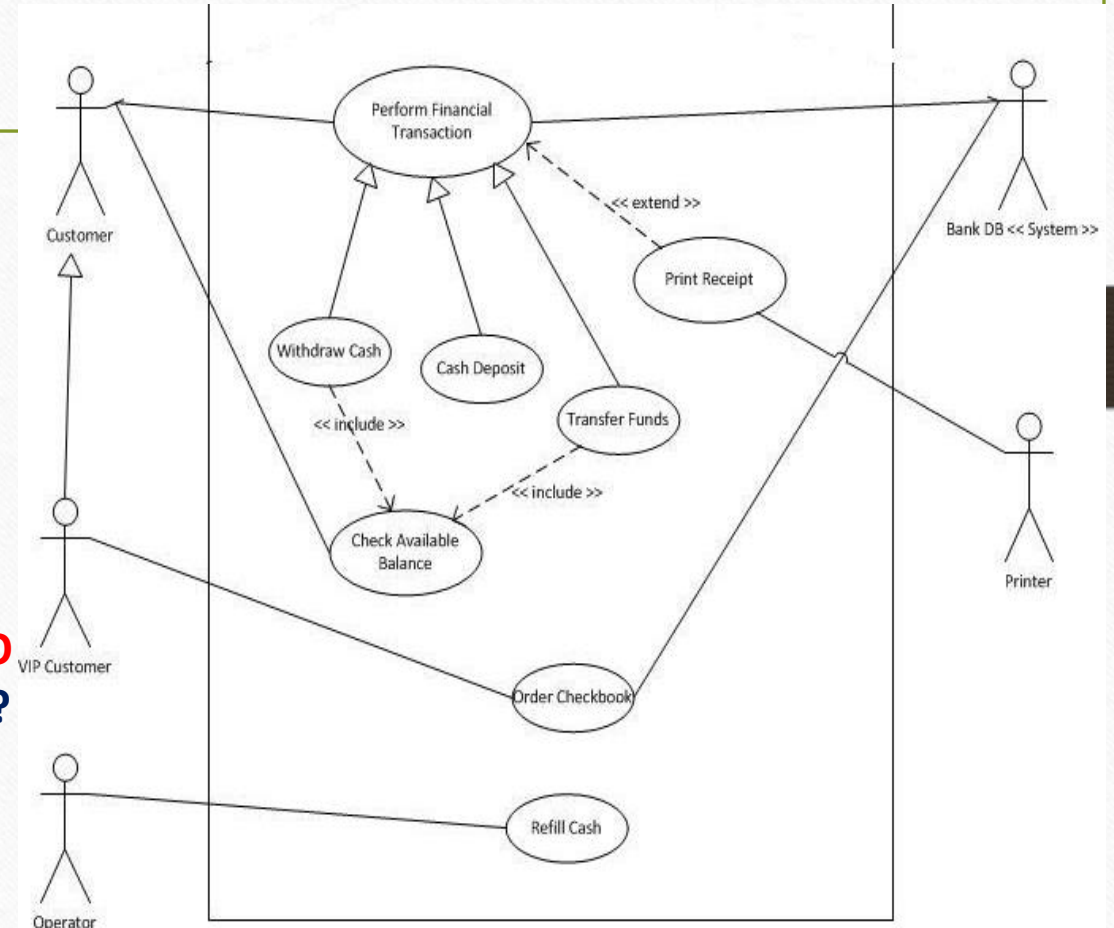
Withdraw Cash includes Check Available Balance

Withdraw Cash is **depending** Available Balance
The direction of **arrow mark is towards** Available Balance
Arrow mark is NOT information flow

I want to **take a printout** without doing any transaction – **NO**
After doing a Transaction, is it mandatory to take a printout?

NO – Such **optional Activities** are considered as **EXTEND**

INCLUDE n **EXTEND** belong to the same family
Compulsory – INCLUDE , Optional - EXTEND



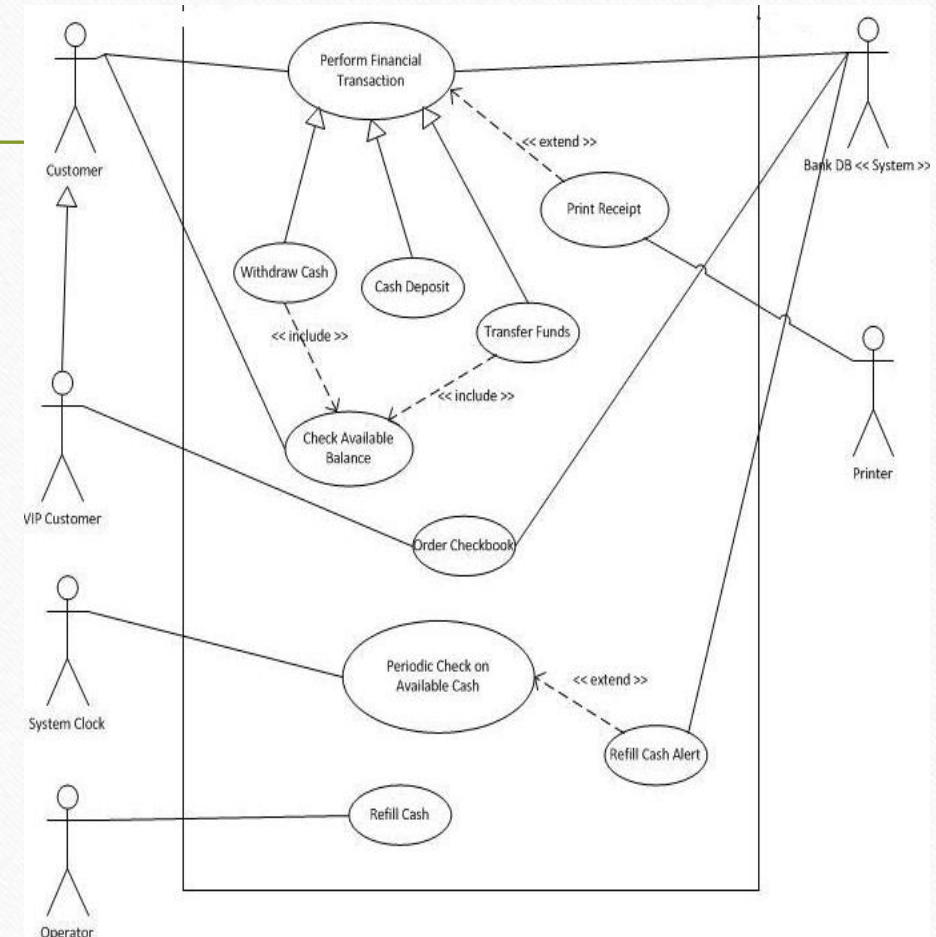
Automation - System Clock

How will the Operator Knows – When to refill Cash
Operator will be informed by the CBS
How CBS knows that ATM is running out of Cash?

ATM – Automated Teller Machine

This machine can do some tasks by itself
ATM by itself checks available cash levels and
If is going a pre-defined limit
Then, it sends and alert to CBS

Machine/ATM doing Some tasks by itself – Automation
And is represented by a special actor – System Clock
And System Clock is a reserved Keyword



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UML - Usecase Diagrams - OFRS -1

Case Study on Online Flight Reservation System

Passenger can do the following

1. Search a Flight
2. Book a Ticket
3. Cancel Ticket

Flight Information is supported by Centralized Flight DB.

OFRS 1 Diagram

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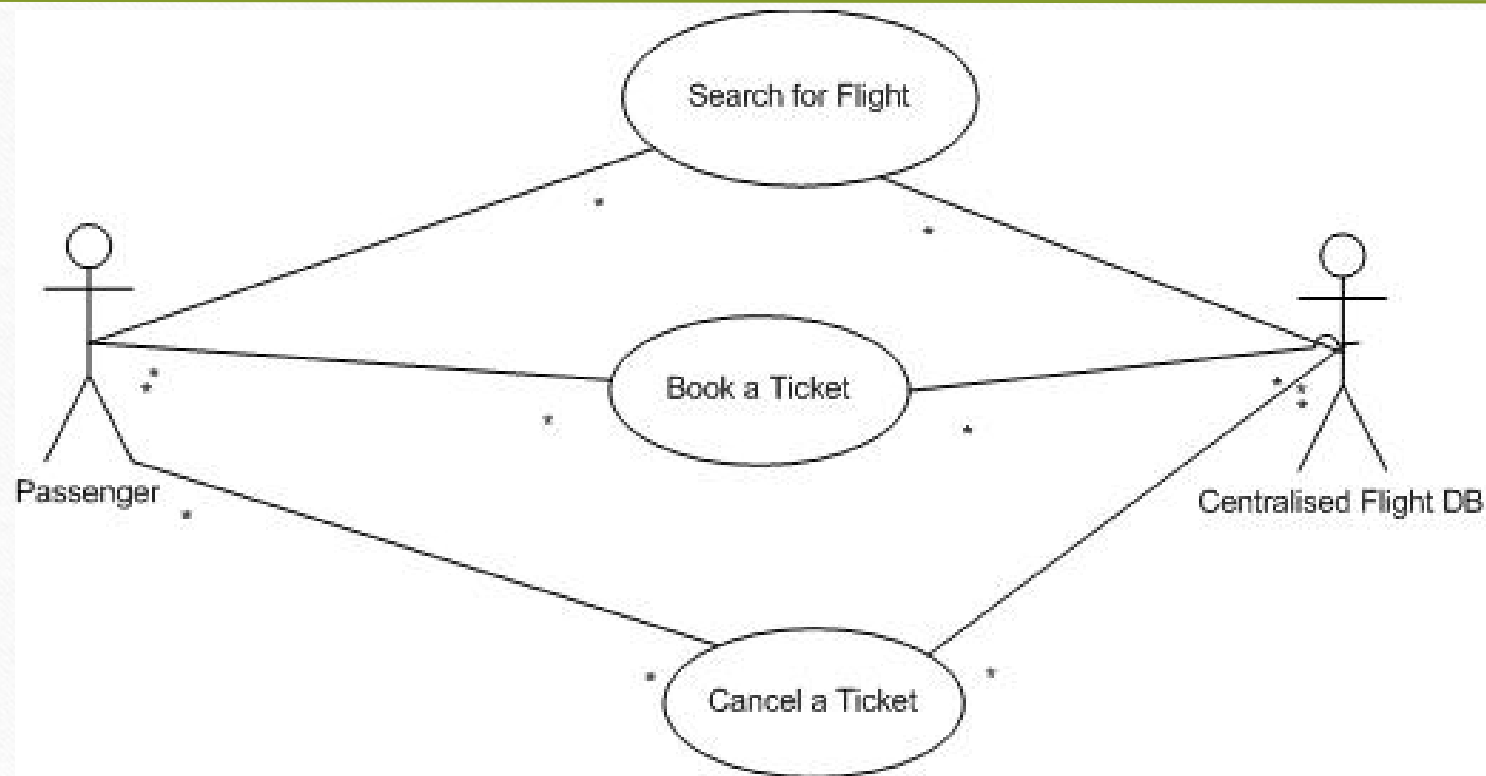


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UML - Usecase Diagrams - OFRS -1- Diagram



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UML - Usecase Diagrams - OFRS -2 Casestudy

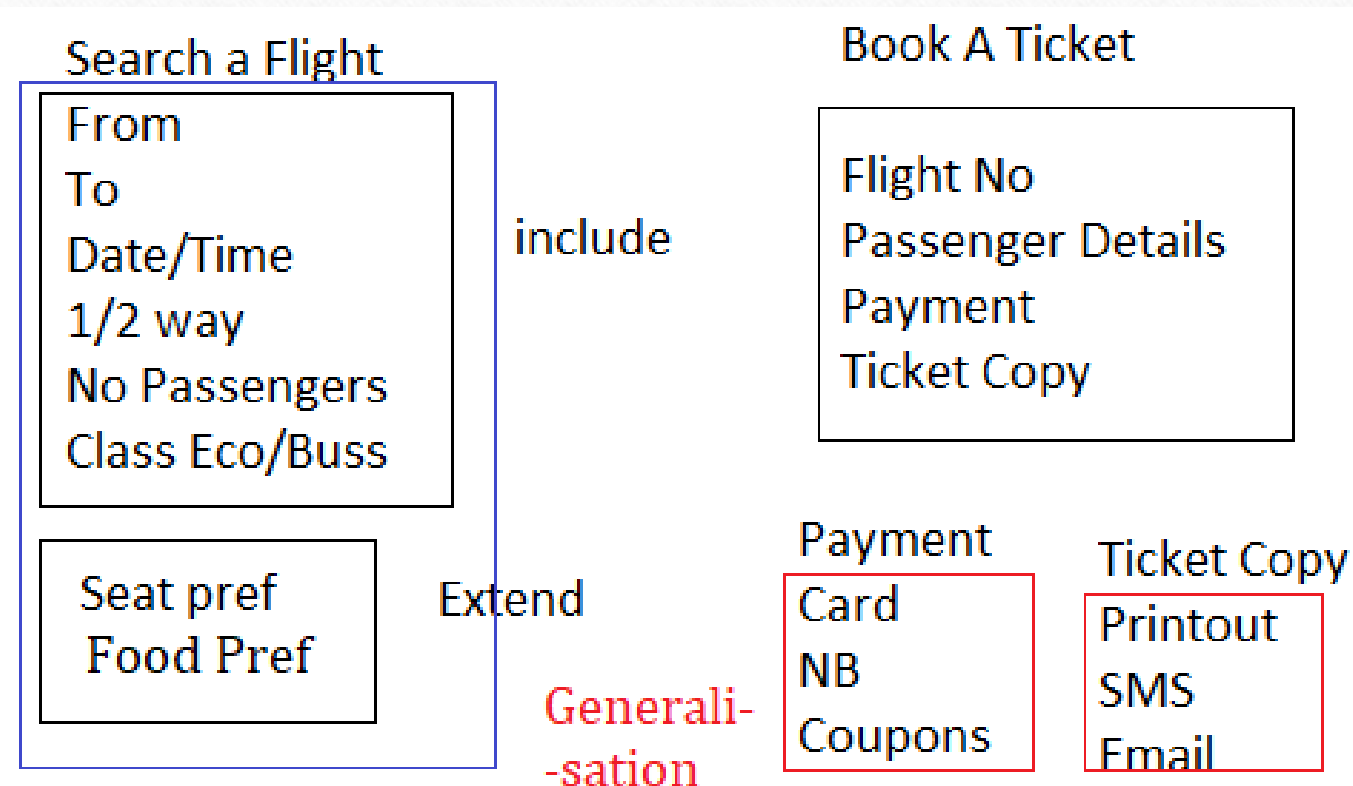
Case Study on Online Flight Reservation System – Version 2

Passenger can Search a Flight, Book a Ticket, Cancel Ticket through this portal. Flight Information is supported by Centralized Flight DB. For searching a flight, following information is mandatory. From Location, To Location, Date/Time, 1way /2 way, Number of passengers, Class (Economy/Business Class). And optional info for search a flight is Seat preferences and food preferences. And For booking a Ticket, following information is compulsory. Flight Details, Passenger Details, Payment and confirming the Ticket. Payment can be done through Card or Net Banking or Coupons. Card payment is supported by FCH – Financial Clearing House, Net Banking is supported by that Bank Online Banking services and Coupons payment is supported by that Coupons Organization. Confirming Tickets can be done through Printout or SMS or email. Printout is supported by the Printer, SMS by online SMS gateway and email is supported by Mail Server.

Case1: After searching for a flight and before you book a ticket – Login is compulsory

Case 2: While booking a Ticket you will get bonus points and using bonus points, we can book a ticket.

UML - Usecase Diagrams - OFRS -2 Casestudy Analysis



OFRS 2 Diagram

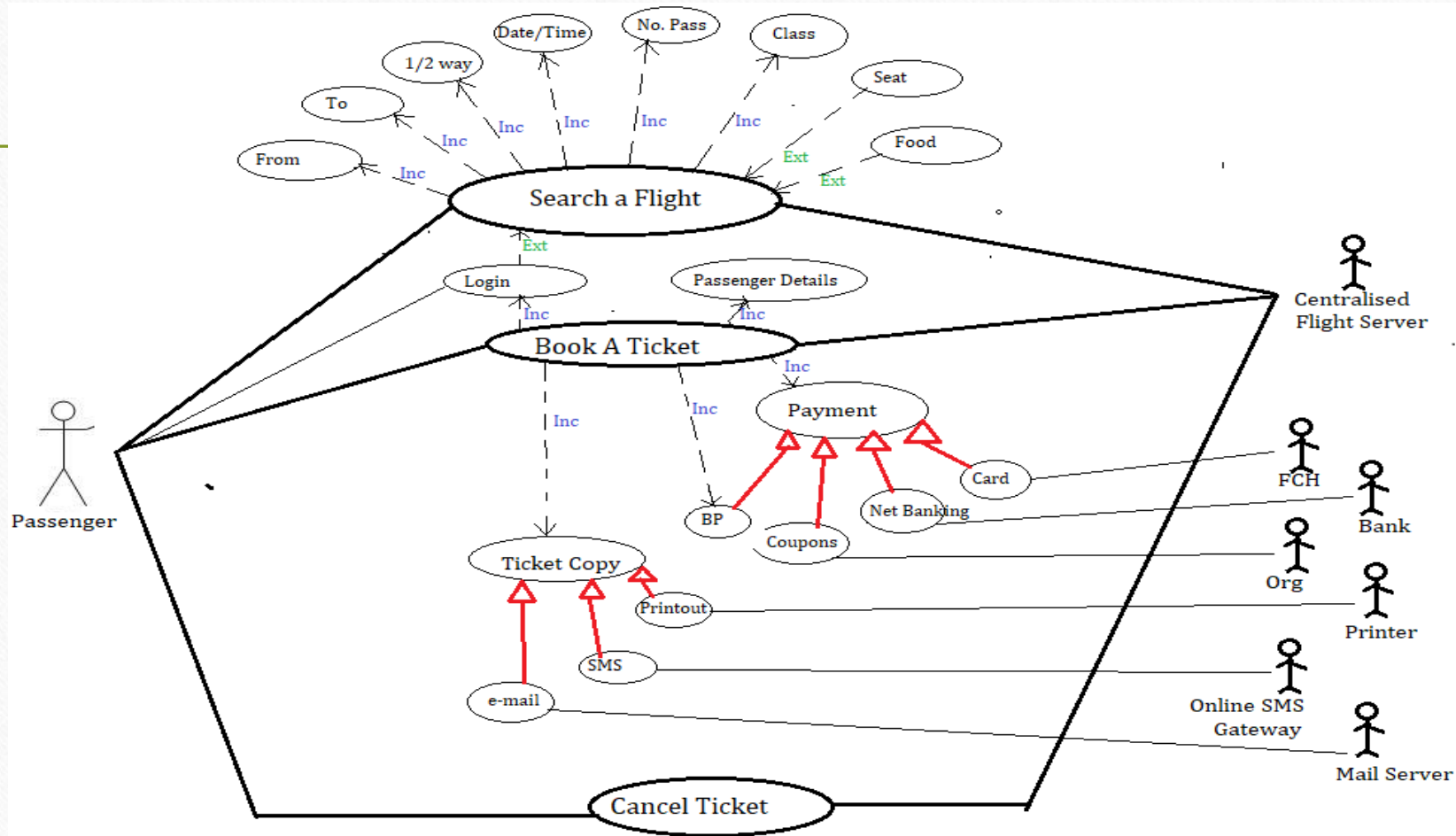
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Examples Include Extend Generalisation

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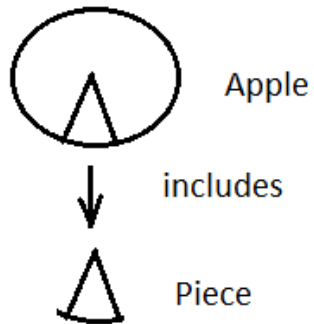


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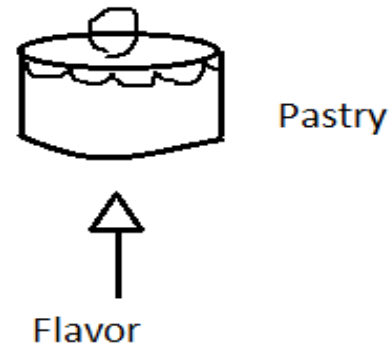


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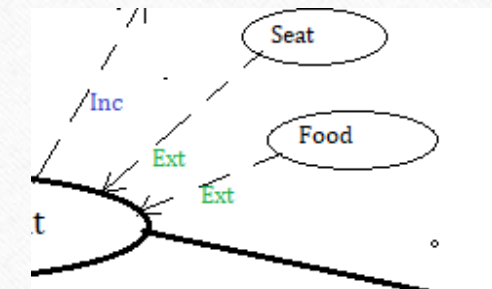
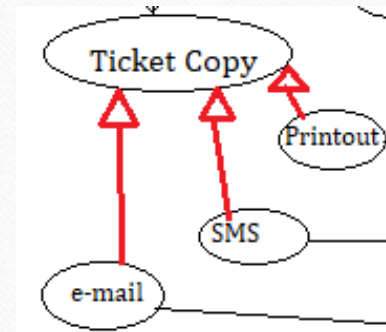
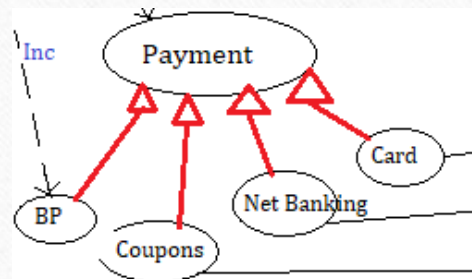
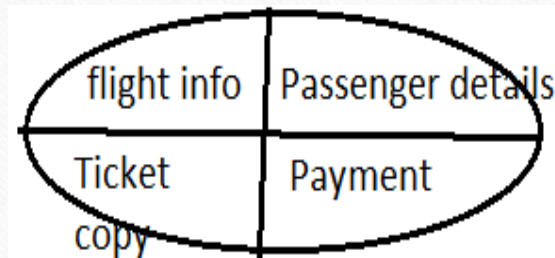
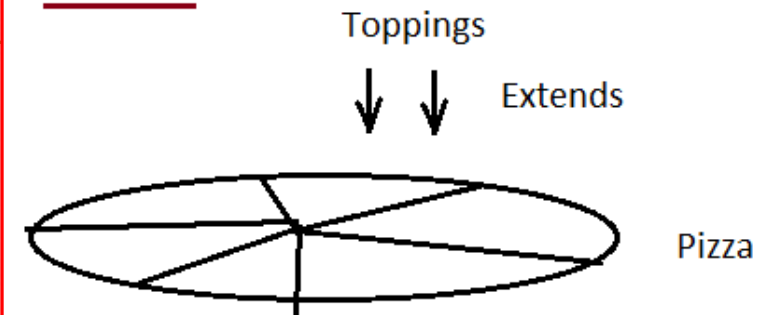
Include



Generalisation



Extends



UML - Usecase Diagrams - Guidelines to draw Usecase Diagrams

We model only the Functional Requirements in a Use Case Diagram and We **do NOT** model Technical information and Labels in Use Case diagrams, which includes

- Names of the systems (laptops, Desktops, Workstations),
- Architectures (2 Tier, 3 Tier, n Tier, Client Server),
- Databases Names (DB2, SQL Server, My SQL)
- Networks (LAN, WAN, Internet),
- Brand Names (HP, Lenova, Wipro, Sony),
- Technology Names (Java, .Net, Mainframes)

Caution: We do not model the development Efforts in a Use Case Diagram, We only model the use case Diagram on How the system will behave after the System is developed

1. Differentiate information against Actions
2. Write all sequence of Actions
3. Try to find out which actor is performing the above action
4. Try to identify Essential Use cases and Supporting Use Cases
5. Try to identify some modules with respect to functionality or usage.
6. Try to draw the relationships appropriately between the identified Actors and Use cases

Course Registration Case Study

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Case Study on Student Course Registration

As the head of information system for Wylie College, you are tasked with developing a new Student Registration System. The College would like a new Client Server System to replace its much older system developed around mainframe technology. The new system will allow students to register for courses and view report cards from personal computers attached to the campus LAN. Professors will be able to access the system to sign up to teach courses as well as record grades.

Due to a decrease in federal funding, the college cannot afford to replace the entire system at once. The college will keep the existing courses catalog database where all the course information is maintained. This database is Ingres Relational Database running on DEC VAX. Fortunately the college has invested in an Open SQL interface that allows access to this database from college's Unix servers. The legacy system performance is rather poor so that the new system must ensure that access to the data on the legacy system occurs in a timely manner. The new system will access course information from the legacy database but will not update it. The registrar's office will continue to maintain course information through another system.

Course Registration System Case Study 2

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At the beginning of each semester, students may request a course catalog containing a list of course offerings to the semester. Information about each course, such as professor, department and prerequisites, will be included to help students make informed decisions.

The new system will allow students to select courses for the coming semester. Course Offerings will have a maximum of ten students and a minimum of three students. A course offering with fewer than three students will be cancelled. For each semester, there is a period of time that students can change their schedule. Students must be able to access the system during this time to add or drop courses. Once the Registration Process is completed for a student, the registration system sends information to the billing system so that the student can be billed for the semester. If a course fills up during the actual registration process, the student must be notified of the change before submitting the schedule for processing.

At the end of the semester, the student will be able to access the system to view an electronic report card. Since student grades are sensitive, the system must employ extra security measures to prevent unauthorized access.

Professors must be able to access the on-line system to indicate which course they will be teaching. They will also need to see which students signed up for the courses for the students in each class.

CRS – Use Case - Observations 1

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As the head of information system for Wylie College, you are tasked with developing a new Student Registration System	
The College would like a new Client Server System to replace its much older system developed around mainframe technology	
The new system will allow students to register for courses and view report cards from personal computers attached to the campus LAN.	Students - Register for Courses Students – View Report Cards
Professors will be able to access the system to sign up to teach courses as well as record grades.	Professors –sign up to teach courses Professors –record Grades
Due to a decrease in federal funding, the college cannot afford to replace the entire system at once	
The college will keep the existing courses catalog database where all the course information is maintained	
This database is Ingres Relational Database running on DEC VAX	
Fortunately the college has invested in an Open SQL interface that allows access to this database from college's Unix servers.	

CRS – use Case -Observations 2

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The legacy system performance is rather poor so that the new system must ensure that access to the data on the legacy system occurs in a timely manner.	
The new system will access course information from the legacy database but will not update it.	Legacy System → Course Catalog
The registrar's office will continue to maintain course information through another system	The registrar's office will maintain course information through another system.
At the beginning of each semester, students may request a course catalog containing a list of course offerings to the semester	Students - Course Catalog
Information about each course, such as professor, department and prerequisites, will be included to help students make informed decisions	Course Catalog – Prof Signup, Dept, Pre-Req
The new system will allow students to select courses for the coming semester.	Students - Course Registration
Course Offerings will have a maximum of ten students and a minimum of three students.	Course Strength – Max 10 Course Strength – Min 3
A course offering with fewer than three students will be cancelled.	Course Cancel

CRS – Use case - Observations 3

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For each semester, there is a period of time that students can change their schedule	Schedule Time
<u>Students must be able to access the system during this time to add or drop courses</u>	Student – add a Course, drop a course
Once the Registration Process is completed for a student, the registration system sends information to the billing system so that the student can be billed for the semester	Billing System informed
If a course fills up during the actual registration process, the student must be notified of the change before submitting the schedule for processing	Course Fill Notification
At the end of the semester, the student will be able to access the system to view an electronic report card	
Since student grades are sensitive, the system must employ extra security measures to prevent unauthorized access.	Logins
Professors must be able to access the on-line system to indicate which course they will be teaching.	
They will also need to see which students signed up for the courses for the students in each class.	Professor – Checks Strength

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UML - Usecase Diagrams - Course Registration System - Analysis

Students - Register for Courses

Students – View Report Cards

Professors –sign up to teach courses

Professors –record Grades

Legacy System -→ Course Catalog

The registrar's office will maintain
course information through
another system.

Students - Course Catalog

Course Catalog – Prof Signup, Dept, Pre-Req

Students - Course Registration **Billing System** informed

Professor Course Strength – Max 10 , Course Fill Notification

Course Strength – Min 3 Course Cancel

Schedule Time **Student** – add a Course, drop a course

Logins Model Login on top and connect to 1st Actor

Course Registration – Course Name coming from Course Catalog
Course Strength
Schedule Time

System Clock - Schedule Time , Course Fill , Course Cancel

CRS Diagram Version 1

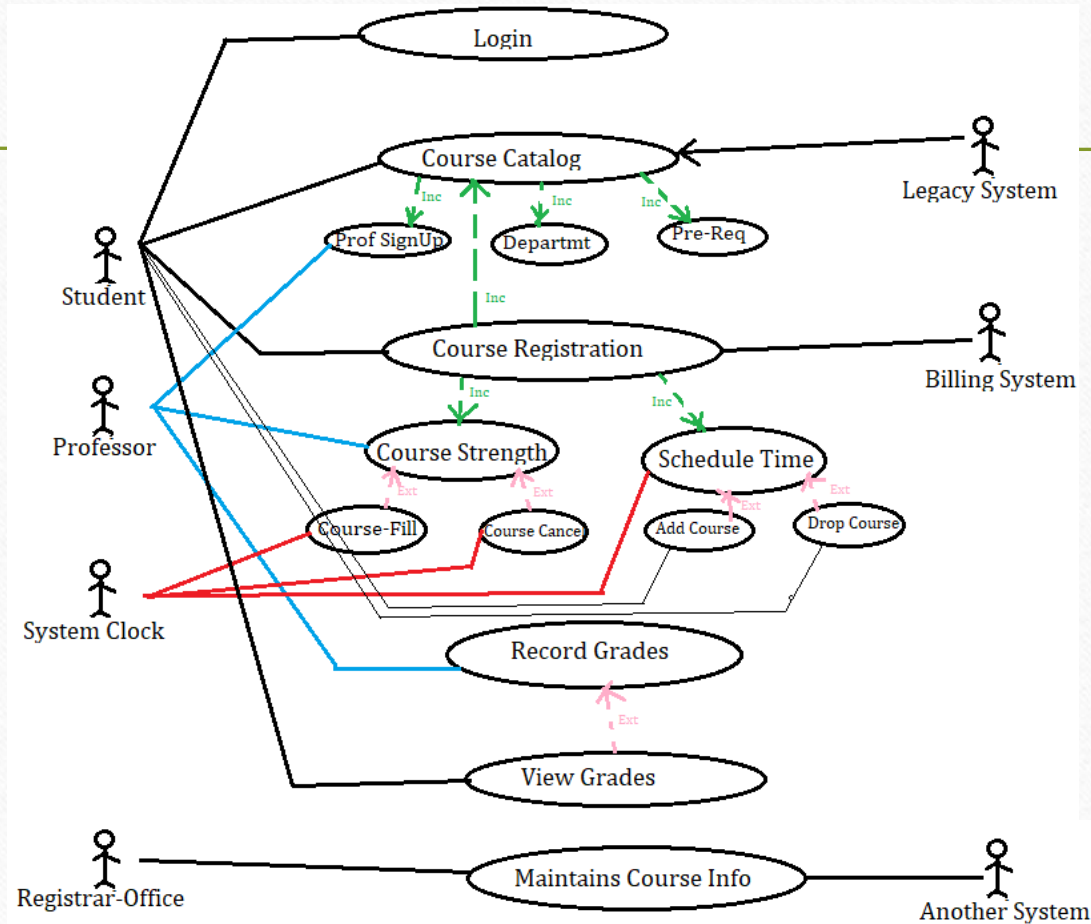
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CRS Diagram Version 2

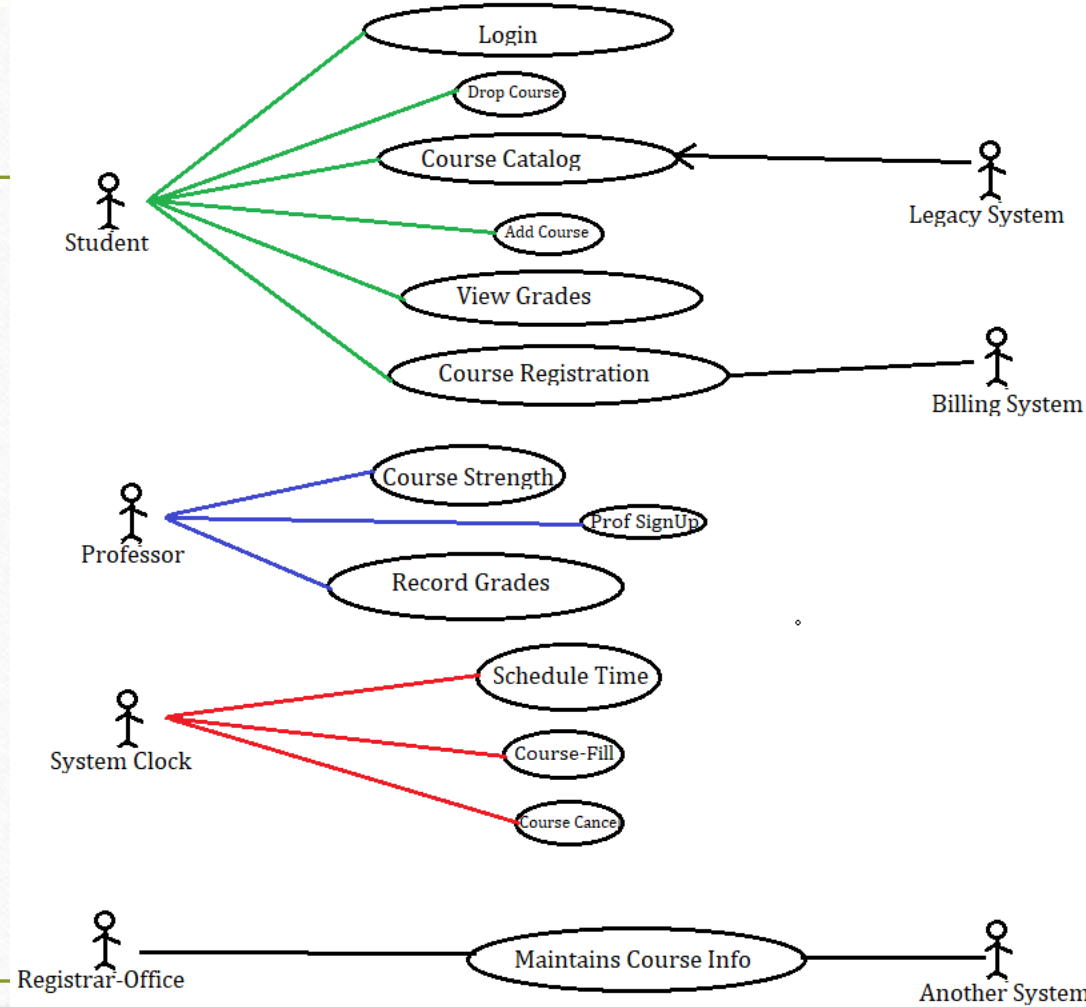
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UML - Usecase Diagrams - Practice Guidelines

Practicing how to draw a diagram involves 5 steps

Step 1: understand the guidelines of how to draw the diagram from a casestudy

Step 2: read the casestudy

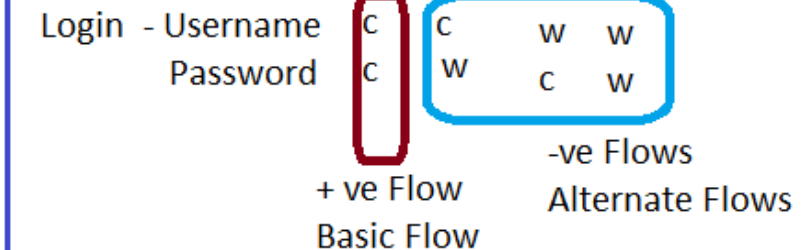
Step 3: understand the analysis and how you got this analysis from casestudy through these guidelines

Step 4: Draw the diagram and understand how you got the diagram from analysis

Step 5: understand the diagram from the Casestudy

One time practice means, you have to do all these 5 steps.

if Understanding is a constraint,
we need not model include, extend n generalisation



in Use case Diagram, we model only the +ve Flow or Basic Flow

Each Use case is supported by 1 Document - Use Case Spec or Use Case Description Document

Use case Spec

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Use Case Spec

Use Case Description Document

Study Material
Use Case Spec
Cash withdrawal from
ATM

Use Case spec - login

Description - Username Password

Actors - prof, Stud -

Pre-conditions - 1. Active internet connection 2. Browser compatible

Post - Conditions - Home Page of Actor should be displayed

Basic Flow - Username n Password are correct

Alternate Flow

1. Password is wrong
2. Username is wrong
3. U n P are wrong

Exceptional Flow :

1. Forgot Password
2. Fogot Username

Assumptions - Users have basic computer knowledge, English

Constraints - Usernames cannot be names

Dependencies - User should exist - Registration process

Input-Outputs - Inputs - Username n Password

output - error code or status flag

Business Rules - Username - valid n unique email id

password - 1 cap, 1 small, 1 num, 1 special - last 5 passwords cannot be repeated, password 8 to 16 char

Mis info : Interactive design, browser compatible

Test Case Document

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Control
Information

Test Case
Document

Scenario
Functionality

Test Data Sets



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Test Case Id	PQ786TS003	Test Case Name	Search Query
Project ID	PQ786	Project Name	Online Flight Reservation
PM ID	4869	PM Name	Raman V
Test Strategy ID	PQ786TS001	Tester Id	
Test Plan ID	PQ786TP001	Tester Name	
Test Schedule ID	PQ786TS001	Date of Test	

Scenario : Explanation about Project and that particular Case

Example: Online Flight Reservation System In that Search for Flight... we have to 8 inputs... 6 compulsory and 2 optional.... Then press Search Button.... And after that results are displayed in a tabular way ...

Link to that page:

	Set 1	Set 2	Set 3	Set 4	Set 5
Input Data	1 Pune 2 Chennai 3 10 Dec YY 4 1 way 5 2 passengers 6 Economy 7 window 8 Veg	1 Hyderabad 2 Chennai 3 13 MAR YY 4 2 way 5 1 passengers 6 Business 7 Asle 8 Non-Veg	1 Nagpur 2 Mumbai 3 17 May YY 4 1 way 5 2 passengers 6 Economy 7 window 8 Veg	1 Delhi 2 Chennai 3 20 July YY 4 2 way 5 1 passengers 6 Economy 7 Asle 8 Veg	1 Pune 2 Delhi 3 25 Sep YY 4 1 way 5 2 passengers 6 Economy 7 window 8 Non-Veg
Expected Behavior	Eg: 10 flights should come for above data				
Actual Behavior					
Comments					
Result Pass/Fail					

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UML - Usecase Diagrams - Derive Test case from Use case

- **Use- case Diagram**
- **Use- Cases**
- **Use-case Description Document**
- **In Use-case Description Document, we have Basic Flow, Alternate Flow and Exception Flows.**
- **From these Flows, we can identify the scenarios.**
- **For each scenario, identify at least 5 sets of valid test data.**
- **This data is sufficient to frame a Test Case.**

3 Tier Architecture

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Architecture - 3 Tier Architecture

BHK
Bedroom Hall Kitchen

Front end. .net
Back end SQL server

In 3 Tier Architecture,
Database layer is not SQL server.
It is the .net connecting to SQL
server

Screens , Pages, Validations on Page,
Company Specific logic, Functionality

————— Application Layer —————

All Re-usable components, Frequently changing components,
Governing Body Rules & Regulations, Compliances ...
Example : Printer, Payment gateways, Mail Servers
RBI rules for Banks, IRDA rules for insurance

————— Business Logic Layer —————

Database components connecting to Databases

————— Data Layer —————

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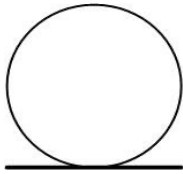


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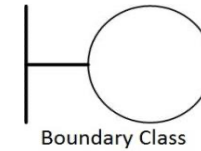
Architecture - MVC Architecture



Entity Class
Data base classes ,
Persistent class
(Back end designers)



Controller Class
Transient Class
(Given to Front end
designers)



Boundary Class
(or) FORM Class



Model – View – Controller (MVC)

Architecture - MVC Architecture - MVC Rules

1. Combination of One Actor and an use case results in one Boundary class
2. Combination of Two Actors and an use case results in two Boundary classes
3. Combination of Three Actors and an use case results in Three Boundary classes and so on.... **Note: only one primary actor is to be considered with a use case.**
4. Use case will result in a controller class
5. Each Actor will result in one entity class

Emp Login Use case

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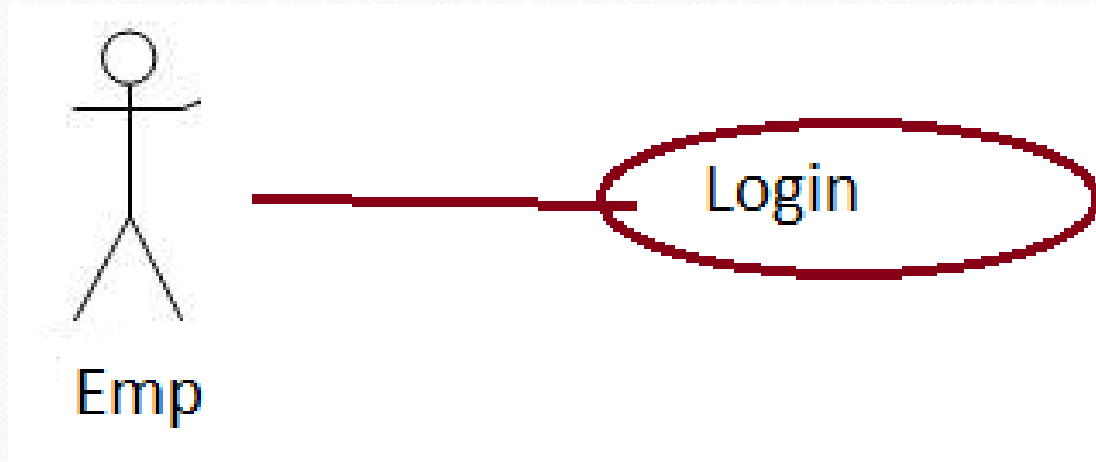


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Architecture - MVC Architecture - MVC Rules Apply -Case 1



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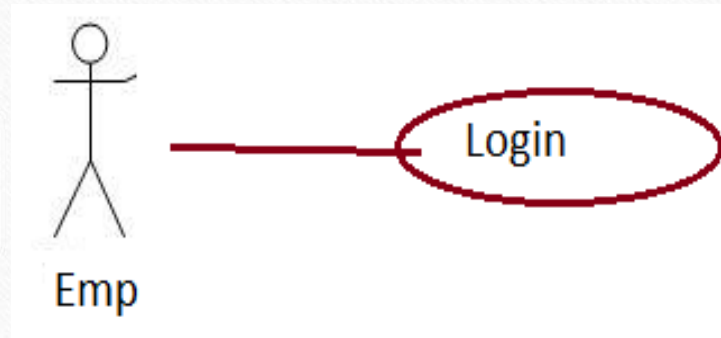


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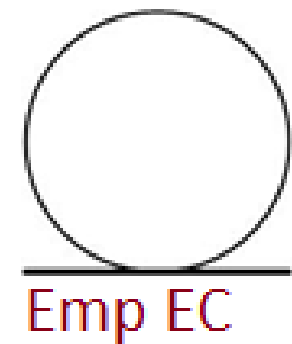
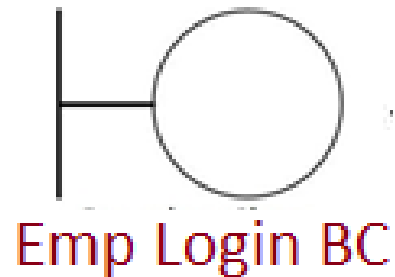
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Architecture - MVC Architecture - MVC Rules Apply -Case 1



Column wise – we have write these Classes
Boundary Classes in one Column , Controller Class in one
Column and Entity Classes in Column

Write Meaningful names for Classes



Operator refill Cash Use case

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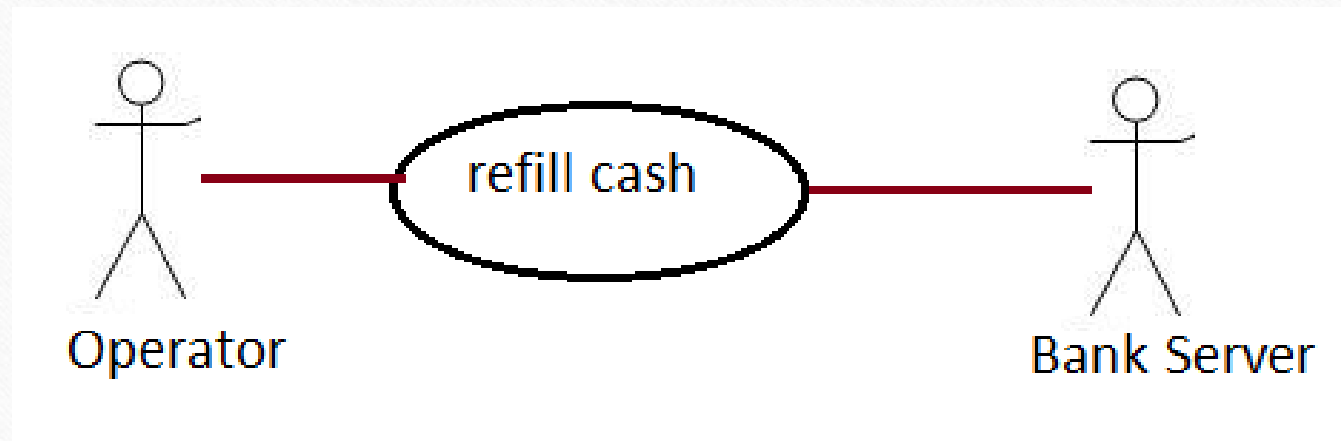


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Architecture - MVC Architecture - MVC Rules Apply -Case 2



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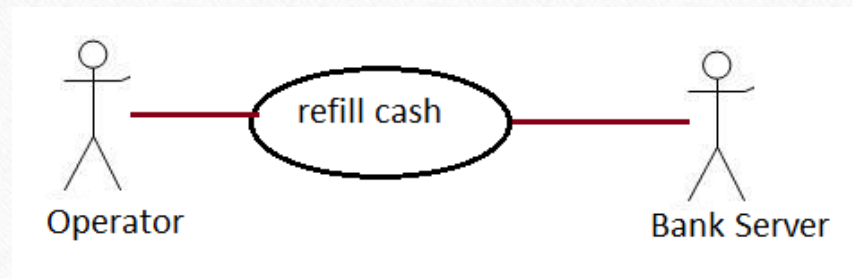


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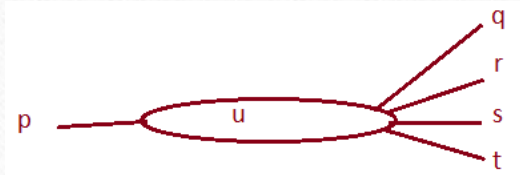


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Architecture - MVC Architecture - Case 2 Solution



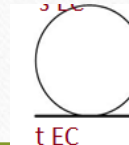
Architecture - MVC Architecture - Easy way to understand MVC



For each line drawn –
One Boundary Class

Usecase –
One Controller Class

Each Actor –
One Entity Class



n Actors
2n+1 Classes

5 Actors
11 Classes

Agent payment Case Study

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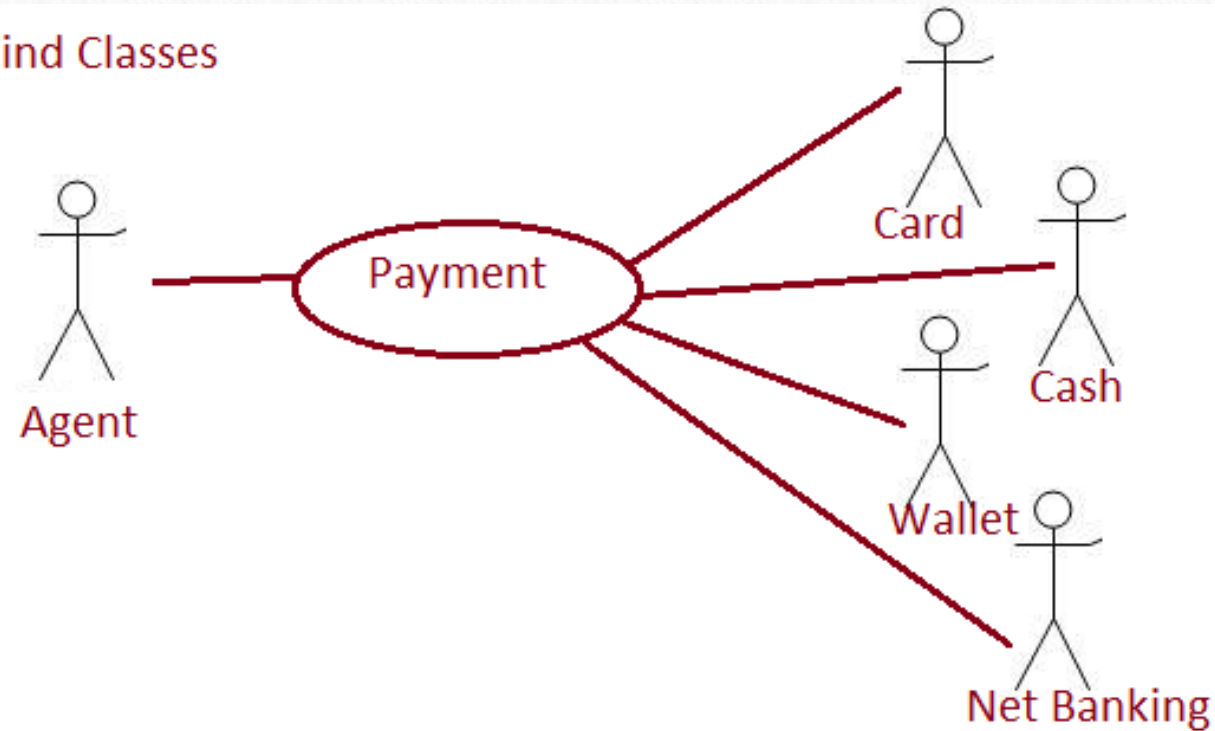
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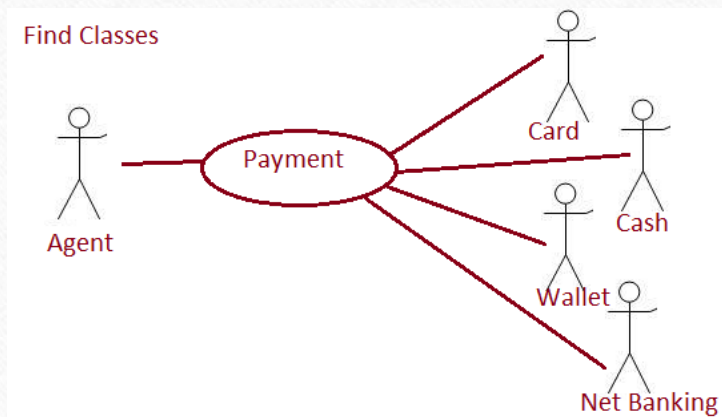
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Architecture - MVC Architecture - Agent Payment Case study

Find Classes



Architecture - MVC- Agent Payment Casestudy - Solution




AMPBC


PaybyCardBC


PaybyCashBC


PaybyWalletBC


PaybyNBBC


PayCC


Agent EC


Card EC


Cash EC


Wallet EC


NB EC

MVC Classes in 3 Tier

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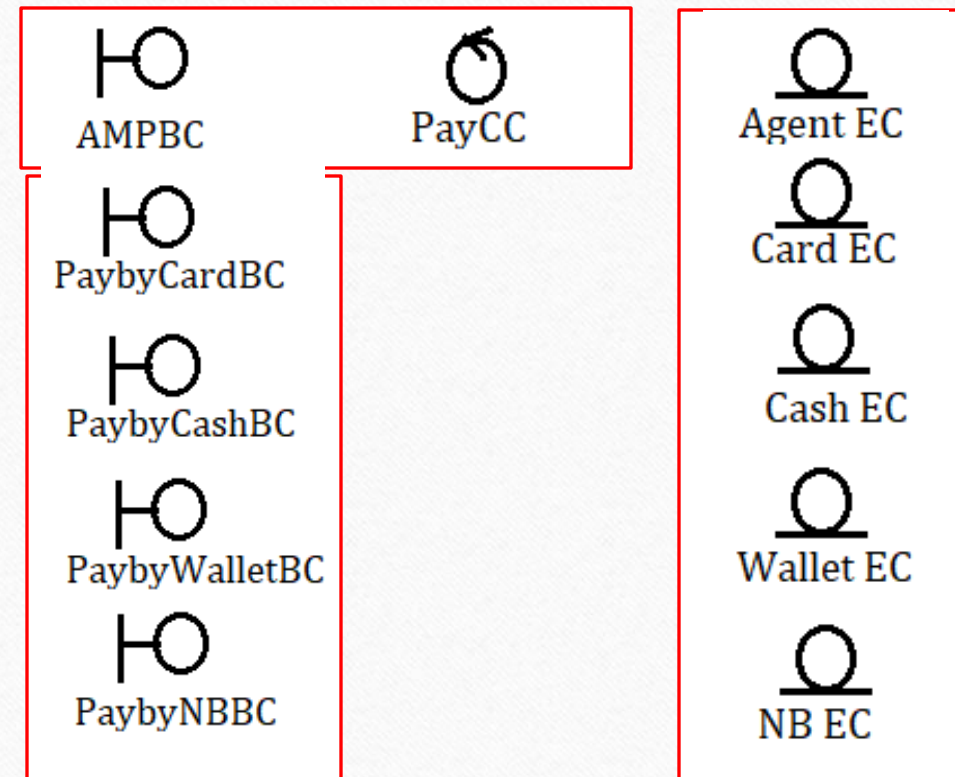
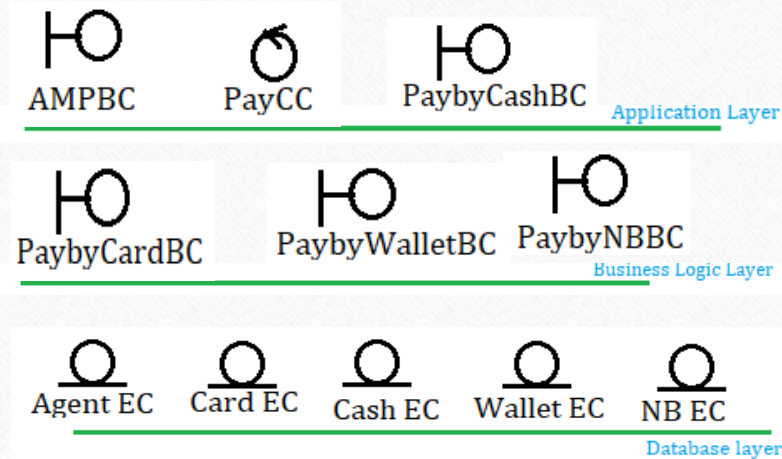
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Architecture - MVC classes to 3 Tier

Place all Entity Classes to DB Layer

Place Primary actor initiated BC and Controller Class in
Application Layer

Remaining BC – if Reusable then Business Logic Layer else
place them in Application Layer



Domain Model

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Agent Making Payment through Card



Domain Model

Conceptual Model

Process Explanation

Agent ... before the system --- Screen --- He will enter

1. Card No 2. Exp Date 3. CVV No

On the Screen itself - AMPBC will be there

AMPBC will capture 1,2,3 and send this info to PayCC through 'a'

Pay CC will add 4. Company Account Details, 5 AMount, 6. Purpose and send 1,2,3,4,5,6 to PayByCardBC through 'b'

PayByCardBC once it got transaction update from FCH, that Transaction info is sent to PayCC through 'c'

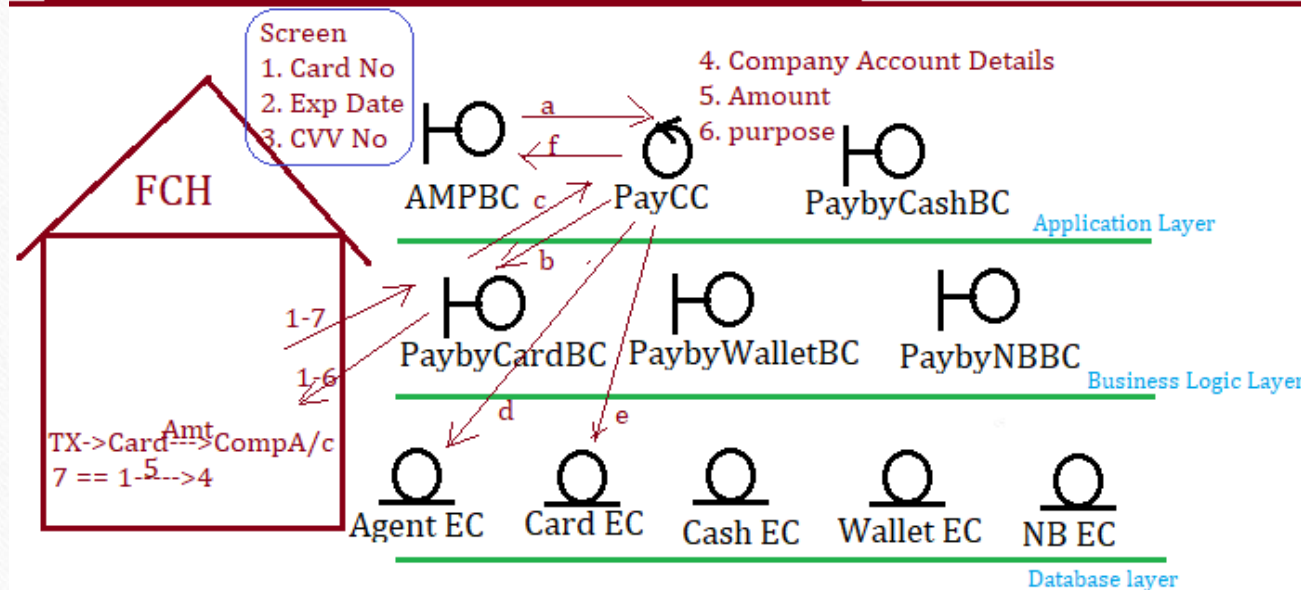
PayCC will update it's own DB i.e.

AEC through 'd' and CardEC through 'e'

then PayCC will send Transaction info to AMPBC through 'f'

AMPBC will display transaction Details on the screen to the Agent

FCH - Our Application will NOT have any Control on FCH



Architecture - Conceptual model- Data model, DFD

Conceptual Model

Agent Making Payment
Card, NB, Wallet, Cash

all possibilities of doing these transactions
Frequency
Volumes
Value
Geographical distribution

Entire Information together
we call it as **Conceptual Model**

Data Model

Data is there at each class

AMPBC - 1,2,3 -a

Pay CC - 1,2,3, -a

Pay CC - 1,2,3,4,5,6 -b

PaybyCard BC - 1,2,3,4,5,6 - b

PaybyCard BC - 1,2,3,4,5,6,7 - c

Pay CC - 1,2,3,4,5,6,7 - c

Data Flow Diagram - DFD

Data which is being flowing from one Class to
another Class

a- AMPBC - PayCC --> 1,2,3

b- PayCC - PayByCardBC --> 1,2,3,4,5,6

c- PayByCardBC -PayCC --> 1,2,3,4,5,6,7

Sequence Diagram

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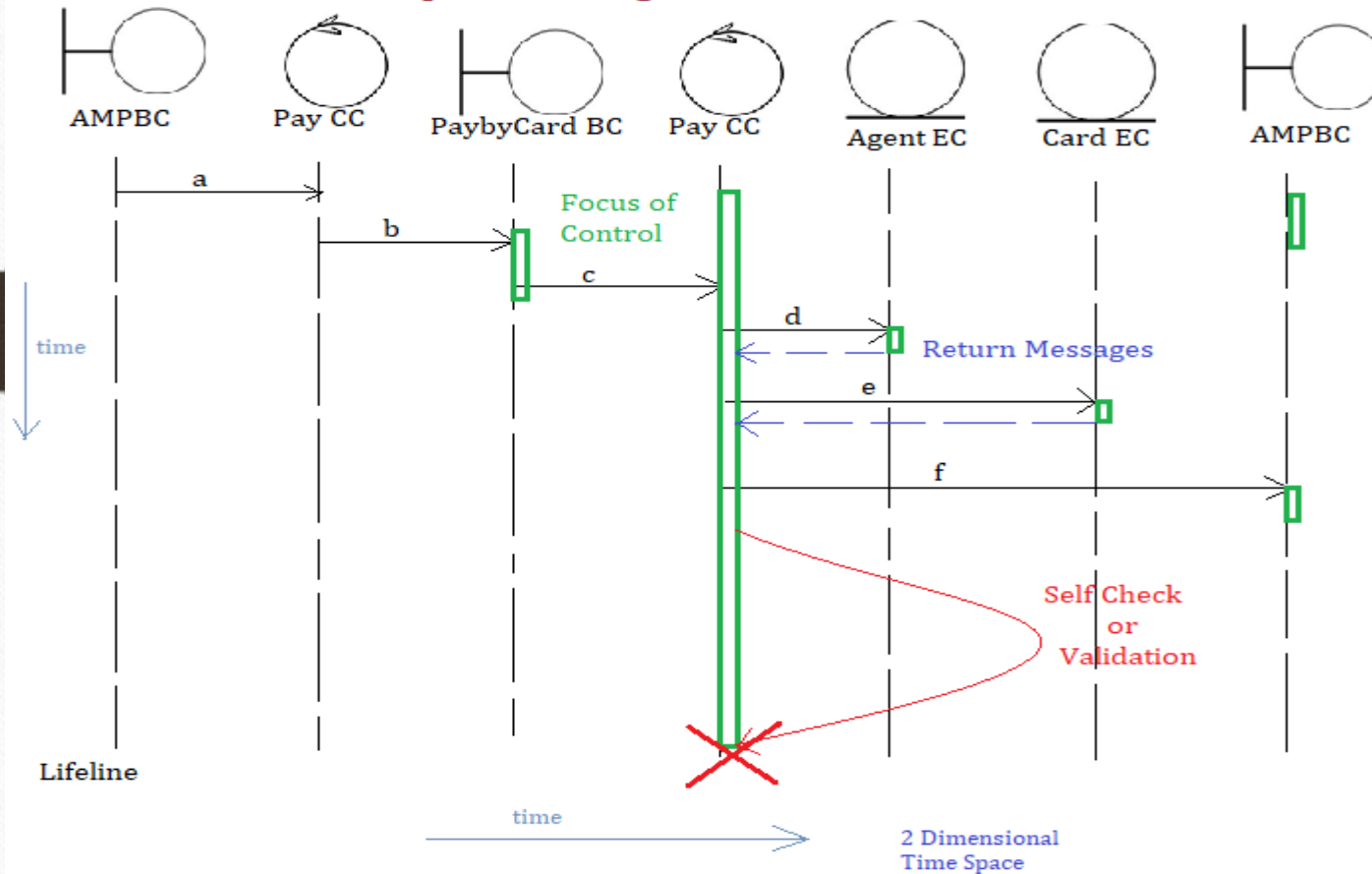


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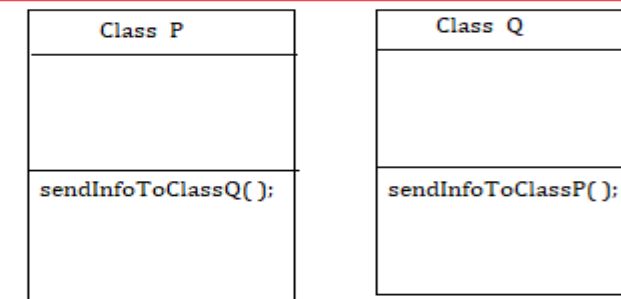
Sequence Diagram



a --> sendAgentCardDetailsToPayCC();
b --> addCompanyDetailsAndSendToPaybyCardBC();
c --> updateTransactionDetailsToPayCC();
d --> updateTransactionDetailsToAgentEC();
e --> updateTransactionDetailsToCardEC();
f --> updateTransactionDetailsToAMPBC();

If PayCC is activated by Method a,
Then

b
c
d
e
f
10 seconds



Message Passing
Message sending

Activity Diagram

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Activity Diagram intro

Book a Ticket
Payment
Ticket Copy

Activity Diagram
Systems
Perspective

Activity Diagram

How a system should behave, in order to achieve Business Objectives, follow Business Rules, and implement Business Logic

Flow Chart
Business Process

Deposit Cash to the Account

Flow Chart

1. Walk into Bank
2. Fill in that form
3. Do that Transaction with the help of Teller

Activity Diagram

1. Deposit Cash to Account with the help of Teller

Flow chart models the entire business process
whereas
Activity Diagrams models where the system is involved.

Activity Vs Flow Chart

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Activity Diagram Vs Flow Chart

Flow Chart Business Process	Activity Diagram System is involved
1. Photographer visits the property 2. Photographer clicks pics of the property 3. Photographer uploads pics in the portal	1. Accept Property Pics from the Photographer

Activity Diagram Drawing Elements

Initial Node
Start Node

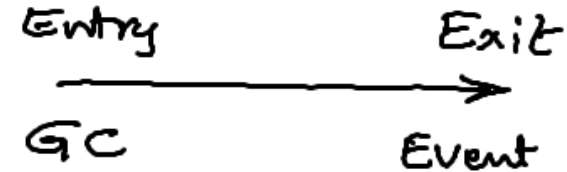


Activity

It is a unit of work done by the system or a consistent state achieved by the system - It has 1 input and 1 output



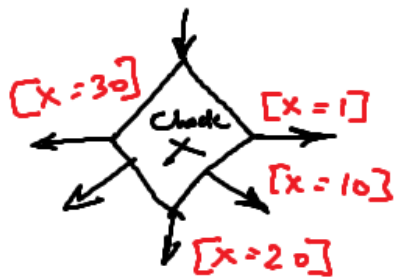
Final node
End Node



Stop Node

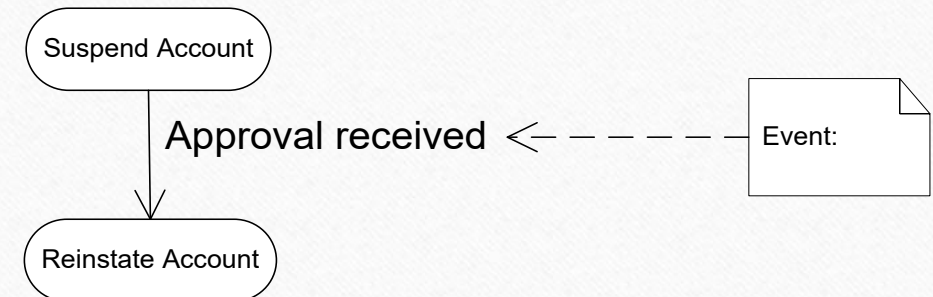


Control Flow
Control Lines

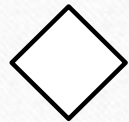


Decision Box
l : m
Condition

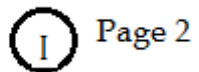
[Guard condition]



Activity Diagram Drawing Elements -2



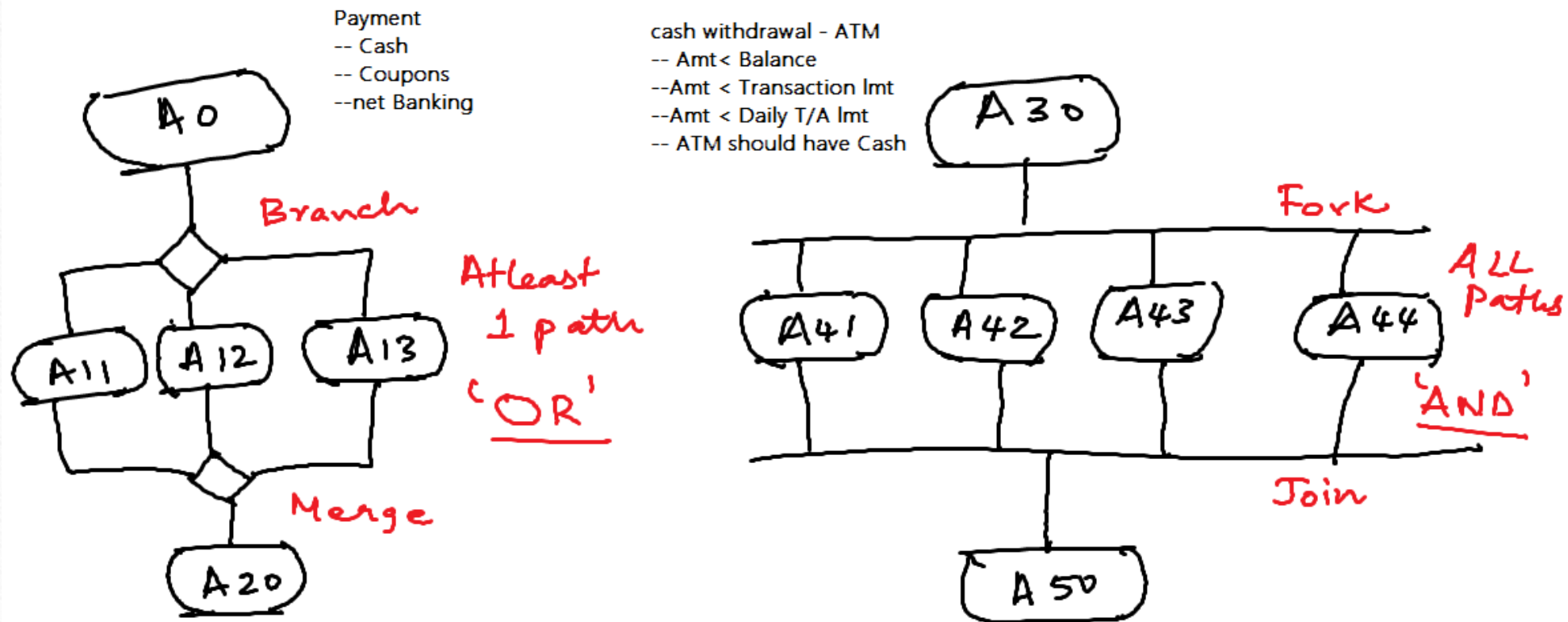
A **connector** has multiple inputs and multiple outputs.
Practically we use connectors for 1- many and many-1.



Continuation Node

If Activity is big and is spanning pages . We give **continuity from one page through another page** by using Continuation Nodes.
It can also be used to **connect extreme left to right sides in a page** or for **reusability of a particular flow**

Activity Diagram Drawing Elements 3



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Activity Diagram Patient - HMS Case Study

Every hospital big or small keeps the records of its patients including the registration details of the patient and the fee payments. The entry of patients is determined whether s/he has arrived in emergency, OPD or for a routine check-up. The patient who gets admitted is provided with a room according to his/her choice. The patient is allotted a doctor according to his illness. The doctor may refer the patient to another doctor with expertise of the illness. On discharge, the patient is required to settle the bills sent by the accounts department of the hospital.

The hospital also keeps the record of the doctors visiting the hospital, plus the permanent employees of the hospital. Each doctor has a few days associated with his/her visit to the hospital and also the timings when s/he is available in the hospital.

The employees draw their salary from the accounts department. The hospital maintains the record of the inventory of the hospital including the equipment and the medicines, blood bank, etc. A limit for inventory is maintained for every item. When the limit is reached, an order for the purchase of the concerned item is placed. The database is updated after the supplier supplies the product.

Patient Activity Diagram

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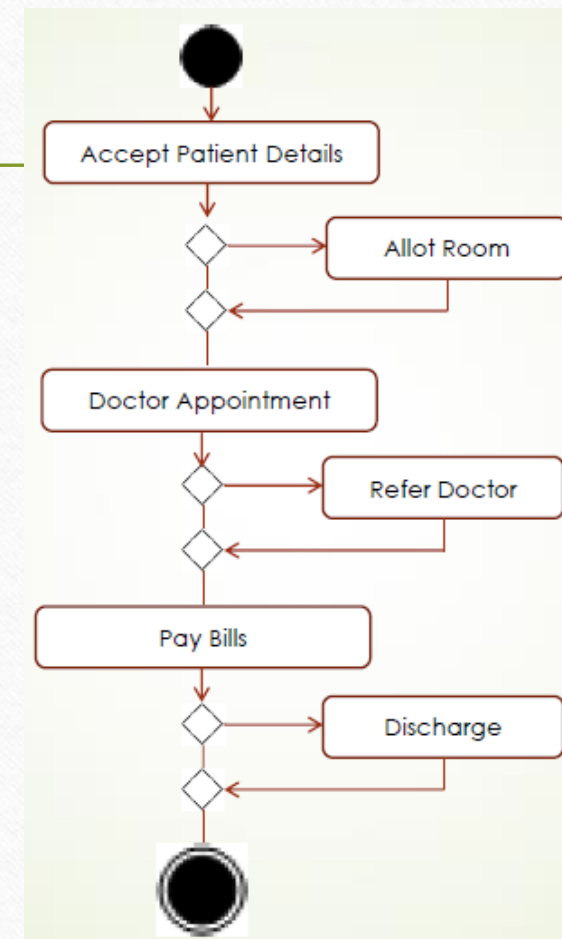


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Patient - HMS Case Study - Solution

RC , Emergency, OPD
Separate Paths – Eligibility Criteria
Are we doing anything Different???

Optional Activity
Branch n Merge and a Dummy Line



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Activity Diagram Guidelines to draw

We model only the Functional Requirements in an Activity Diagram and We **do NOT** model technical information and Labels in Activity diagrams, which includes

- Names of the systems (laptops, Desktops, Workstations),
- Architectures (2 Tier, 3 Tier, n Tier, Client Server),
- Databases Names (DB2, SQL Server, My SQL)
- Networks (LAN, WAN, Internet),
- Brand Names (HP, Lenova, Wipro, Sony),
- Technology Names (Java, .Net, Mainframes)

Caution: We do not model the development Efforts in an Activity Diagram, We only model the Activity Diagram on How the system will behave after the System is developed.

So before drawing an activity diagram we should identify the following Components:

**Activities,
Conditions, Events**

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Activity Diagram Guidelines-2

- ❖ Identify list of Activities A1, A2, ... , list of Conditions C1, C2,... and list of Events E1,E2,...
- ❖ An Activity is a unit of Work done by the system or the consistent state achieved by the System.
- ❖ Conditions are where $\leq$ symbols comes and don't confuse sequence Activities with Conditions.
 - Sequence Activities example :
- ✓ You write an Exam and you get Results. This is NOT a Condition.
 - Conditions Example :
- ✓ Marks scored $< 35 \rightarrow$ Fail ($<$ less than)
- ✓ Marks scored $\geq 60 \rightarrow$ First Class ($\geq$ greater than or equal to)
- ❖ Events are **System Events**. Events are externally triggered or a **consistent point of a specified time**.
 - Like office starts at 10am, you went by 10:40am, then late will be triggered on you.
 - Any time frame involved with any Activity, should be considered to be an Event.
- ❖ Write all Activities, Conditions, Events from **System Perspective only**.
- ❖ Try to find out which Activity is the first activity by applying Bubble sort and then the second activity and then third activity like that ...
- ❖ Understand where Decision Box comes, Guard Conditions, Events and where Branch and Merge & Fork n Join comes and also any Continuation Nodes
- ❖ With appropriate mind layout and using relevant drawing elements, draw the diagram

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Case Study on Student Course Registration

As the head of information system for Wylie College, you are tasked with developing a new Student Registration System. The College would like a new Client Server System to replace its much older system developed around mainframe technology. The new system will allow students to register for courses and view report cards from personal computers attached to the campus LAN. Professors will be able to access the system to sign up to teach courses as well as record grades.

Due to a decrease in federal funding, the college cannot afford to replace the entire system at once. The college will keep the existing courses catalog database where all the course information is maintained. This database is Ingres Relational Database running on DEC VAX. Fortunately the college has invested in an Open SQL interface that allows access to this database from college's Unix servers. The legacy system performance is rather poor so that the new system must ensure that access to the data on the legacy system occurs in a timely manner. The new system will access course information from the legacy database but will not update it. The registrar's office will continue to maintain course information through another system.

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At the beginning of each semester, students may request a course catalog containing a list of course offerings to the semester. Information about each course, such as professor, department and prerequisites, will be included to help students make informed decisions.

The new system will allow students to select courses for the coming semester. Course Offerings will have a maximum of ten students and a minimum of three students. A course offering with fewer than three students will be cancelled. For each semester, there is a period of time that students can change their schedule. Students must be able to access the system during this time to add or drop courses. Once the Registration Process is completed for a student, the registration system sends information to the billing system so that the student can be billed for the semester. If a course fills up during the actual registration process, the student must be notified of the change before submitting the schedule for processing.

At the end of the semester, the student will be able to access the system to view an electronic report card. Since student grades are sensitive, the system must employ extra security measures to prevent unauthorized access.

Professors must be able to access the on-line system to indicate which course they will be teaching. They will also need to see which students signed up for the courses for the students in each class.

CRS – Activity - Observations 1

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As the head of information system for Wylie College, you are tasked with developing a new Student Registration System	
The College would like a new Client Server System to replace its much older system developed around mainframe technology	
The new system will allow students to register for courses and view report cards from personal computers attached to the campus LAN.	A1 - course is Regd to Stud A2 - Display grades to Stud
Professors will be able to access the system to sign up to teach courses as well as record grades.	A3 - Accept Prof signup for courses A4 - Accept Stud grades from Prof
Due to a decrease in federal funding, the college cannot afford to replace the entire system at once	
The college will keep the existing courses catalog database where all the course information is maintained	
This database is Ingres Relational Database running on DEC VAX	
Fortunately the college has invested in an Open SQL interface that allows access to this database from college's Unix servers.	

CRS – Activity -Observations 2

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The legacy system performance is rather poor so that the new system must ensure that access to the data on the legacy system occurs in a timely manner.	
The new system will access course information from the legacy database but will not update it.	A5 - Accept Course Catalog from Legacy System
The registrar's office will continue to maintain course information through another system	A6 - Registrar Office will maintain course info through Another System
At the beginning of each semester , students may request a course catalog containing a list of course offerings to the semester. Information about each course, such as professor, department and prerequisites, will be included to help students make informed decisions	E1 – Begin of semester A7 - Display Course catalog with all details to stud
The new system will allow students to select courses for the coming semester.	A8 - Accept stud options for courses
Course Offerings will have a maximum of ten students and a minimum of three students.	C1 – Course strength max 10 C2 – Course strength min 3
A course offering with fewer than three students will be cancelled.	A9 - Course Cancel

CRS – Activity- Observations 3

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For each semester, there is a period of time that students can change their schedule	E3– Schedule Time
<u>Students must be able to access the system during this time to add or drop courses</u>	A10 – Accept Stud – adding a Course A11 – Accept Stud – dropping a Course
Once the Registration Process is completed for a student, the registration system sends information to the billing system so that the student can be billed for the semester	A12 – Billing System informed
If a course fills up during the actual registration process, the student must be notified of the change before submitting the schedule for processing	A13 – course fill notification
At the end of the semester , the student will be able to access the system to view an electronic report card	E2 – End of semester
Since student grades are sensitive, the system must employ extra security measures to prevent unauthorized access.	
Professors must be able to access the on-line system to indicate which course they will be teaching.	
They will also need to see which students signed up for the courses for the students in each class.	A14– prof checks course strength

CRS Activity Diagram Analysis

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Activity Diagram CRS Study

BASE A1 - course is Regd to Stud

After A2 - Display grades to Stud

Before A3 - Accept Prof signup for courses

After A4 - Accept Stud grades from Prof

Before A5 - Accept Course Catalog from Legacy System

After A6 - Registrar Office will maintain course info through Another System

Before A7 - Display Course catalog with all details to stud

Before A8 - Accept stud options for courses

Before A9 - Course Cancel

Before A10 - Accept Stud - adding a Course

Before A11 - Accept Stud - dropping a Course

After A12 - Billing System informed

Before A13 - course fill notification

After A14 - prof checks course strength

Conditions

C1 - Course strength max 10

C2 - Course strength min 3

Events

E1 - Begin of semester

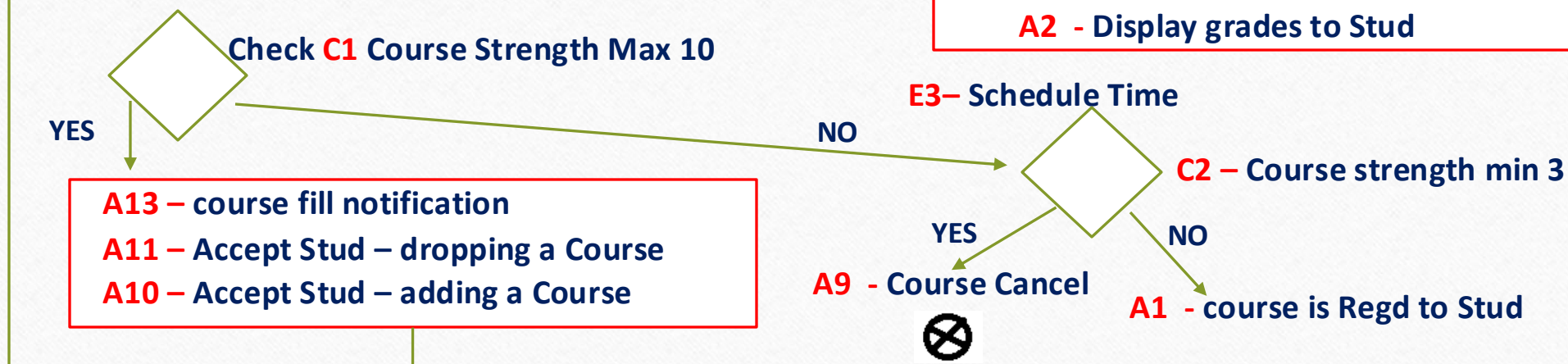
E2 - End of semester

E3 - Schedule Time

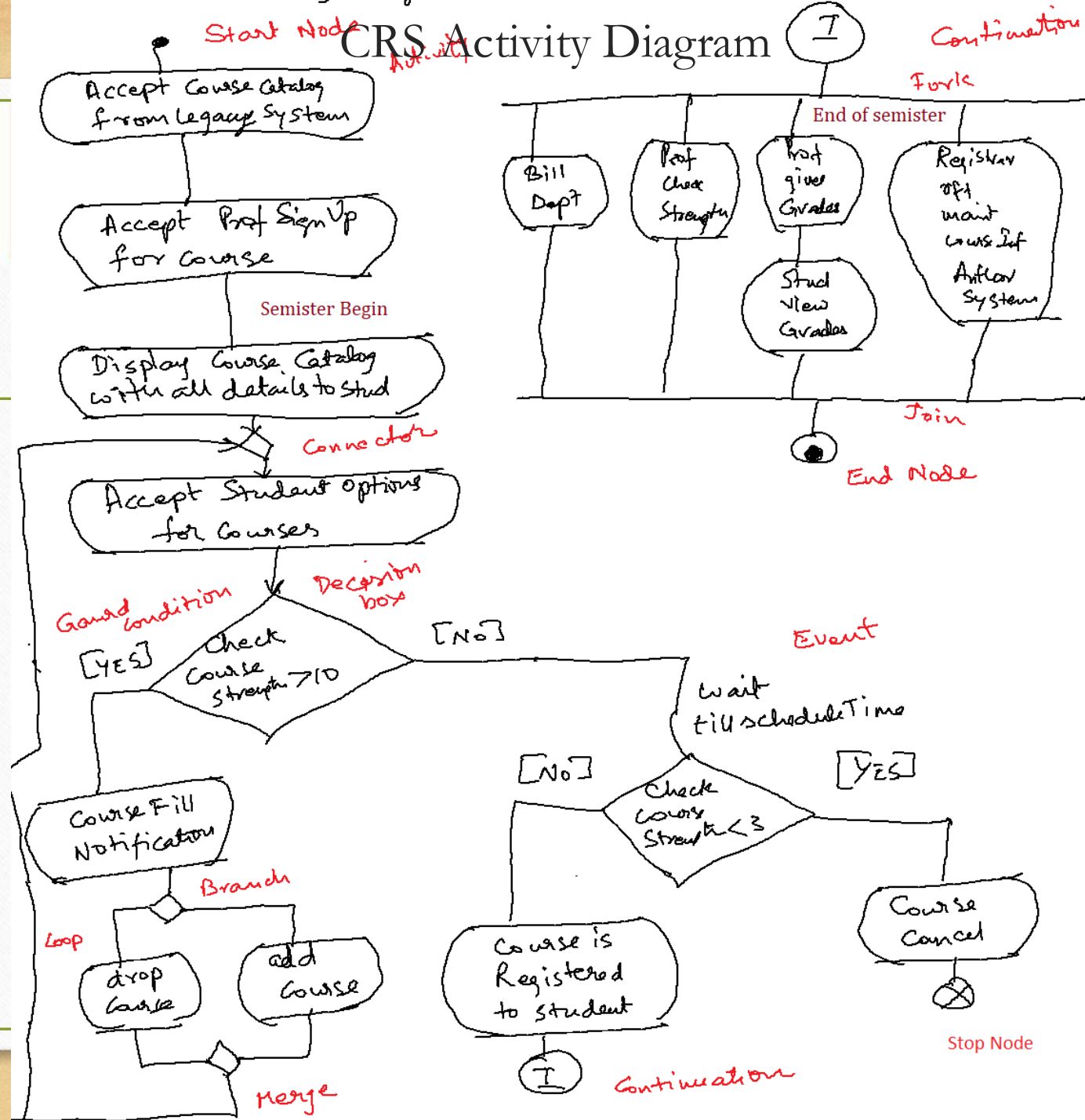
Activity Diagram CRS Study - Analysis

- A5** - Accept Course Catalog from Legacy System
- A3** - Accept Prof signup for courses
- A7** - Display Course catalog with all details to stud
- A8** - Accept stud options for courses

- A14** - prof checks course strength
- A12** - Billing System informed
- A6** - Registrar Office will maintain course info through Another System
- A4** - Accept Stud grades from Prof
- A2** - Display grades to Stud



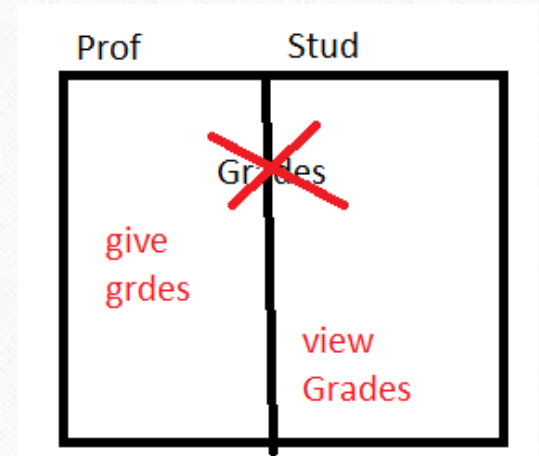
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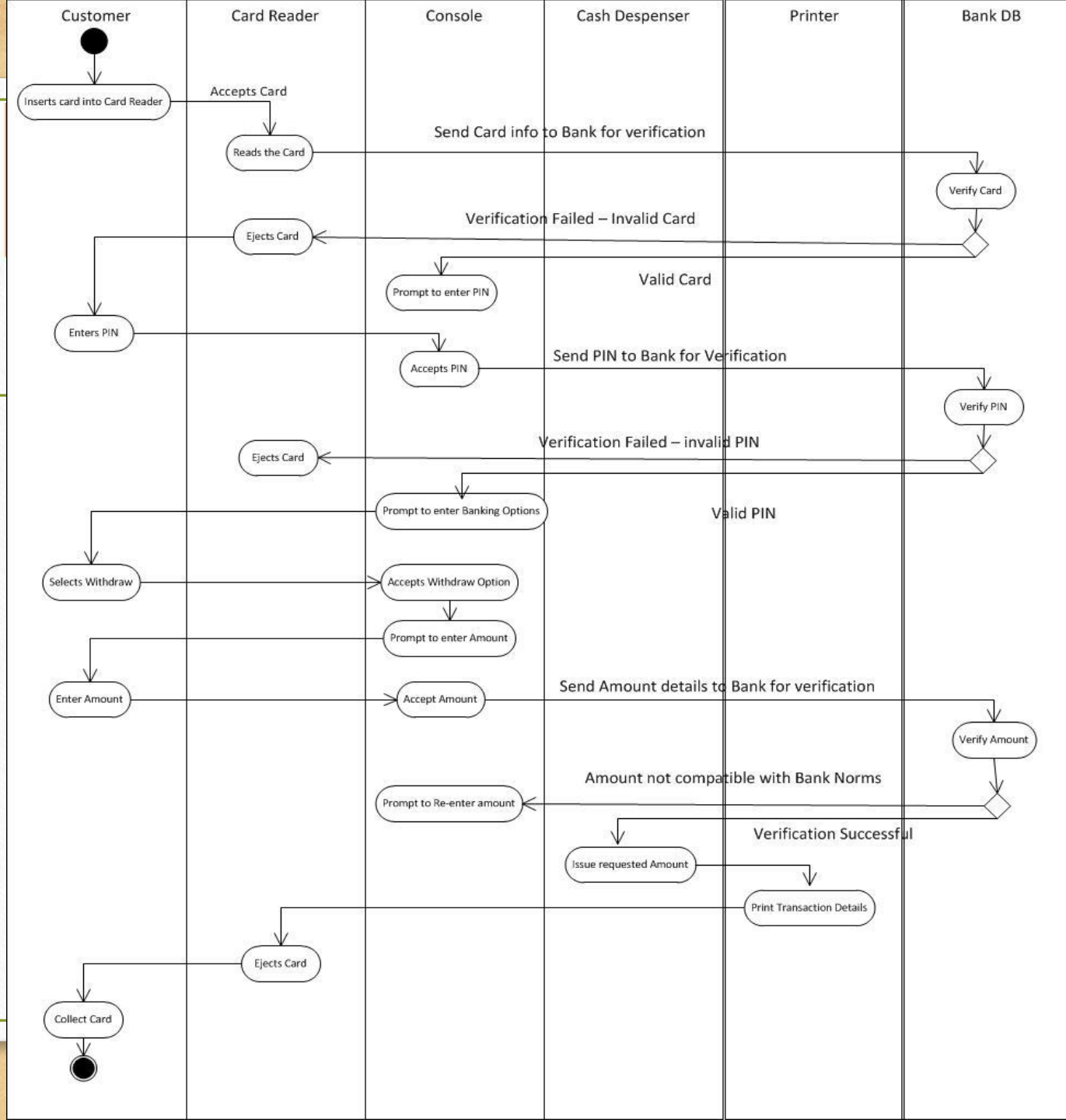
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Activity Diagram Swimlanes

- Swimlanes divide activity diagrams into sections. Each swimlane is separated from adjacent swimlanes by vertical, solid lines on both sides.
- Each action is assigned to one swimlane.
- Activity flows can cross lanes.
- We cannot model an Activity in-between Swimlanes
- Swimlanes do not change ownership hierarchy.
- The relative ordering of swimlanes has no semantic significance.
- There is no significance to the routing of an activity flow path.
- Parts representing internal behavior can be specified on swimlanes.
- Have Less Than eight Swimlanes.

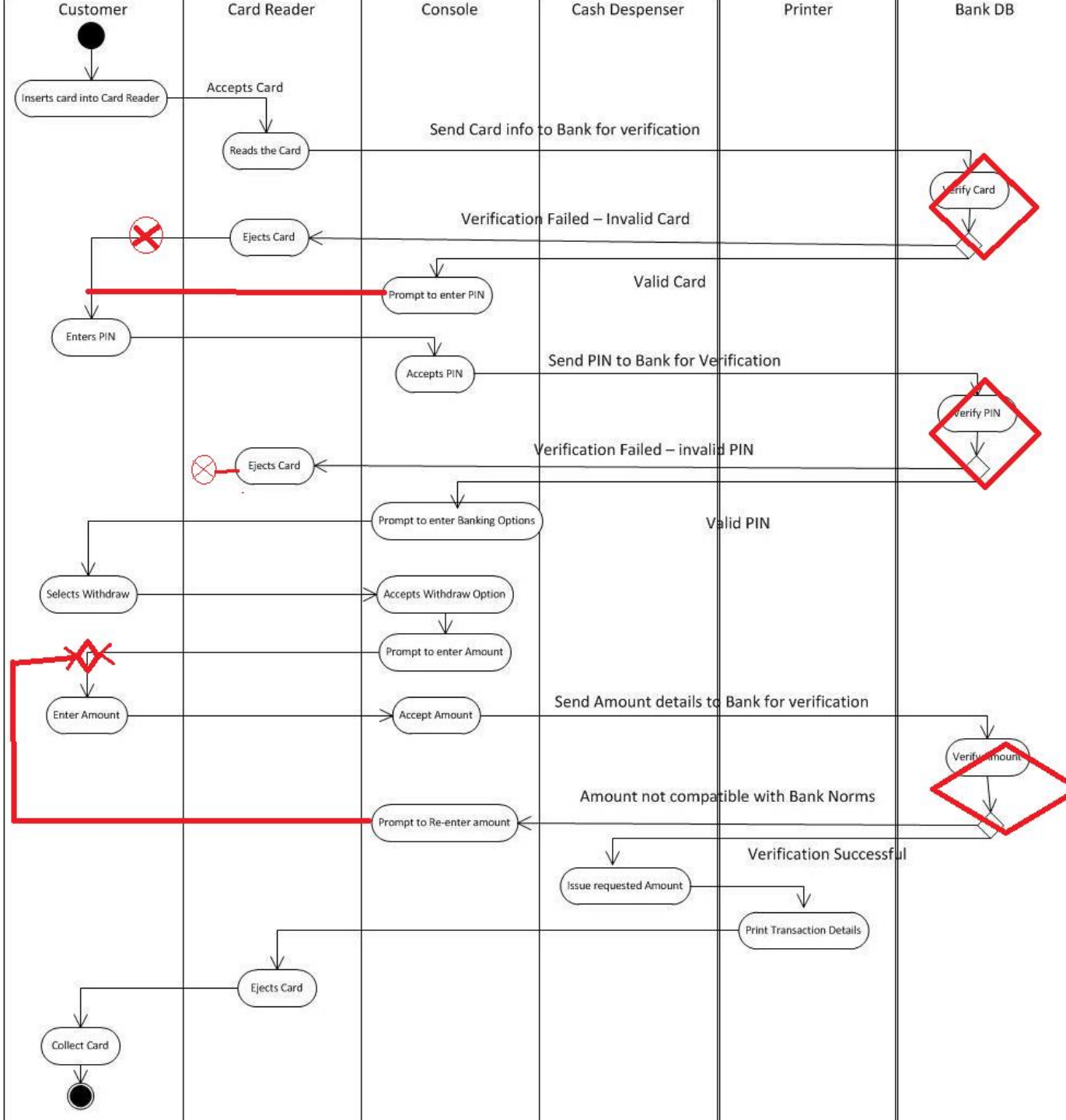


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Activity Diagram Important Points

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Activity Diagram Important Points

1. Activity Diagrams are drawn to **simplify Complexity**
2. Activity Diagrams can be **drawn at any level**
 - * Project wise, module wise, department wise, functionality wise, use case wise
3. Activity Diagrams can be **drawn based on frequency**
 - * Setup, 1 Time, Annual, Half-yearly, Quarterly, Monthly, Weekly, Daily, Predefined Frequency and Adhoc basis - specific to an initiative
4. We can draw **multiple Activity diagrams for a single Case study** where as it will be only one Use case diagram.
5. If we are drawing multiple Activity Diagrams for a single case study Every Diagram should have a **heading based on level and time frequency**

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Case Study Use Case Activity

For a case study ,we **DO NOT MODEL TECHNICAL INFORMATION LABELS & DEVELOPMENT EFFORTS**

First come up with analysis

Actions and actors

Draw Use case diagram

For each use case –

prepare Use case specs

Identify the flow or **Functionality**
Identify activities, conditions
events and

Draw Activity Diagrams –
at **use case spec level** and
cover the functionality and
then **the module** and
then finally **the project**

Requirements Engineering Introduction

Requirements Engineering starts from

- identify the sources of Requirements i.e. stakeholders,
- Elicit Requirements, Document,
- Model and Confirm the Requirements,
- Prioritize and Validate the requirements,
- Communicate and Manage the Requirements and
- facilitate Solution Evaluation and Implementation

And is best understood by 3 Steps

1. Requirements Initiation (Gathering Stage)
2. Requirements Management
3. Solutions Evaluation and Implementation -UAT

Requirements Initiation

- Stakeholder Analysis ILS , RACI
- Apply Elicitation Techniques
BDRFOWJIPQU
- Sort the requirements
Defining the requirements
- Prioritize requirements -MOSCOW
- Validating requirements – FURPS
- Good requirements qualifications
SMART

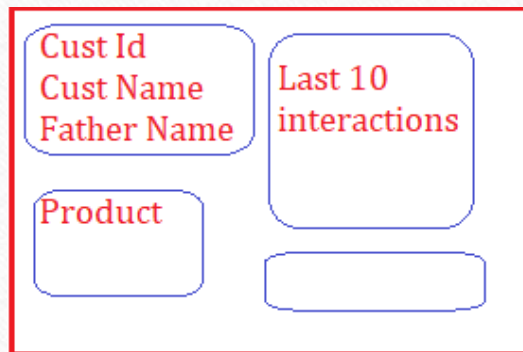
BRD - Business Requirement Document

ILS Approach

Our IT Company get SOW from Client
Statement of Work – SOW
With SOW , Stakeholder Document
HOD Info
SPOC – POC
Process – 800 Resources - 700 Resources –
List
10 Resources – Summary
➤ Identify ,List and Summary (ILS approach)

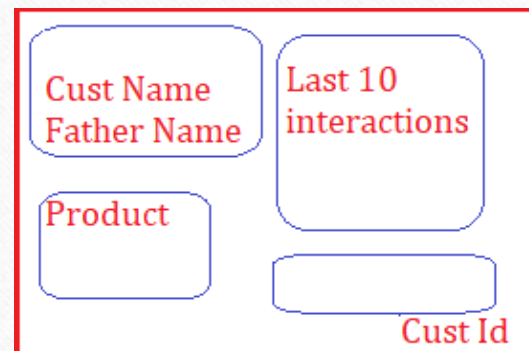
RACI Matrix - BPM BA Case Study

BPM BA - Company – BA
Improve on the process
Calling Process
In-Bound , Out-Bound
Each Call is supported by
one Page on Screen



Observation- Calls

No-one is using Cust-ID
But Cust-ID is there in **Prime Area**
Prime Area is top left corner of
rectangle, square or any space
As our first eye-sight goes there
You want to move Cust-ID from top
left corner to bottom right corner



Conduct one meeting with team leads

Explain them your observation

Some TL may say GO-AHEAD

Some TL may object

Decision to make Change – Send Circular

100's	<u>Informed</u> - End Users
10's	<u>Consulted</u> - Ambassador Users
1 or 2	<u>Accountable</u> - Process Experts
1	<u>Responsible</u> - SPOC/POC

Project – 8 Modules
8 RACI Matrix

RACI Matrix - Airtel Case Study

RACI - Airtel - new tariff plan

Requirement	Responsible	Accountable	Consulted	informed
New Tariff Plan	1. VP 1 2. VP 2 3. VP 3	1. GM1 2. GM2 3. GM3 4. GM4 5. GM5	1. Admin1 2 Admin 2 3. admin3 4. Admin 4 5. Admin 5 6. Admin 6	1. Customers 2. Cust Care 3. Channel Mrs 4. Resources

Elicitation Techniques - 1

Brainstorming Sessions

Given Bus Req – Unable to derive
Functional Req

SME – Domain Experts

Invite 13 Resources – 10 may
participate

Book the conference hall
Give Ideas on how to solve the
problem – 5W, 1H
Rate the ideas

MOM – meeting minutes

Problems – Challenges –

Using Mind-mapping

Using Brainstorming tools

Evernote , Freemind

Document Analysis

is done through reading a
document and understanding
the product,
process and project.

All Projects

Reverse Engineering

back engineering -the processes of
extracting knowledge or design
information from anything man-made
and re-producing it - involves
disassembling something and
analysing its components and
workings in detail.

Migration Projects

Focus Groups

means to elicit ideas and attitudes about a
specific product, service or opportunity in an
interactive group environment.

Homogenous Heterogenous

Observation

Observing, shadowing users or doing a part of their
job, can provide information of existing processes,
inputs and outputs.

Passive Active

Workshops - requirement workshop is a structured
approach to capture requirements. used to scope,
discover, define, prioritize and reach closure on
requirements for the target system. Role-Plays

Practical in nature -Aim at completeness

Elicitation Techniques -2

JAD – Joint Application Development

Networking Project -

Networking Resource

DB Project – DB Admin

Testing Project – Test Mgrs

**Tech Team – When you discuss
Requirements with Client**

Use Case Specs

Detailed Document

covering all Flows and

information to develop that
functionality

Interview

**Some Requirements contradict other
Requirements**

Appointment with Stakeholders

Structured Approach

Unstructured Approach

Questions – Open ended ,Closed ended

Prototyping

**Showing the sample of
working model**

Activity Diagrams Flowcharts

Questionnaire Survey Forms

Feedback forms

1000 Stakeholders

Multiple Questions

Multiple Choice Answers

Ratings – Poor Fair Good Excellent

Pre-defined values

Tools – Statistical measures

Mean-Median- Mode

Deviation – Std Deviation

Skewness -Regression

Sorting the Requirements - Define

Requirements Definition

It is the process in which scattered requirements are put together and redundancy is removed

The inter-related requirements are linked

Key Tasks are

- Define Stakeholder needs
- Identify Business needs and
- divide them into functional and non functional requirements
- Create group of similar requirements
- Create supporting artifacts

Prioritising the Requirements- MoSCoW

Must - 100% Compulsory Requirements

Even one Requirement is missed, Project will be a Failure

Should - Important Requirements – Pre-requisites

Grading System – Inputs – Online Exam – Development not completed

Could - Important Requirements – No Contradiction

Could give these Req – if they don't Contradict MUST Requirements

MUST Req – Page should load in 2 Sec time - Animation – 30 Sec

Would / Won't - Low Priority Requirements

We would like to give these Req in next Cycle or

We won't give these Req in this cycle

Validating the Requirements- FURPS

Functionality - Feature set, Capabilities, Generality, Security

Usability - Human factors, Aesthetics, Consistency, Documentation

Reliability - Frequency/severity of failure, Recoverability, Predictability, Accuracy, Mean time to failure

Performance - Speed, Efficiency, Resource consumption, Throughput, Response time

Supportability - Testability, Extensibility, Adaptability, Maintainability, Compatibility, Configurability, Serviceability, Localizability, Portability

Enhanceable – Data Card

Extendable - USB

Testable - UAT

Non-testable Requirements

Very very Beautiful website

Measurable

Color Combinations

Pixel resolutions

Themes

Page should load Quickly

How many sec – loading time

Qualifications of a Good Requirement- SMART - BRD

SMART

- Specific
- Measurable
- Attainable
- Realistic
- Time Bound

- Stakeholder Analysis ILS , RACI
- Apply Elicitation Techniques
BDRFOWJIPQU
- Sort the requirements
Defining the requirements
- Prioritize requirements -MOSCOW
- Validating requirements – FURPS
- Good requirements qualifications
SMART

BRD - Business Requirement Document

BRD

**Client shares BRD
RE-DO all these
activities**

**Prepare BRD V2
Take signoff from
Client**

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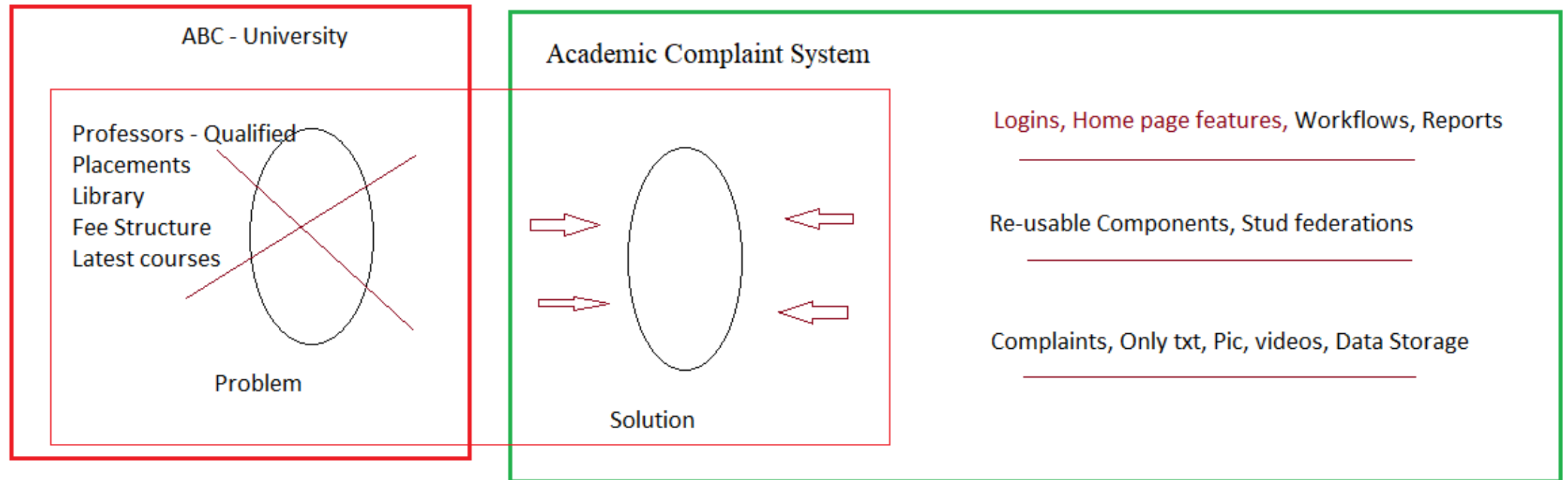
Chapter 7
Requirements
Engineering

ABC University - CaseStudy

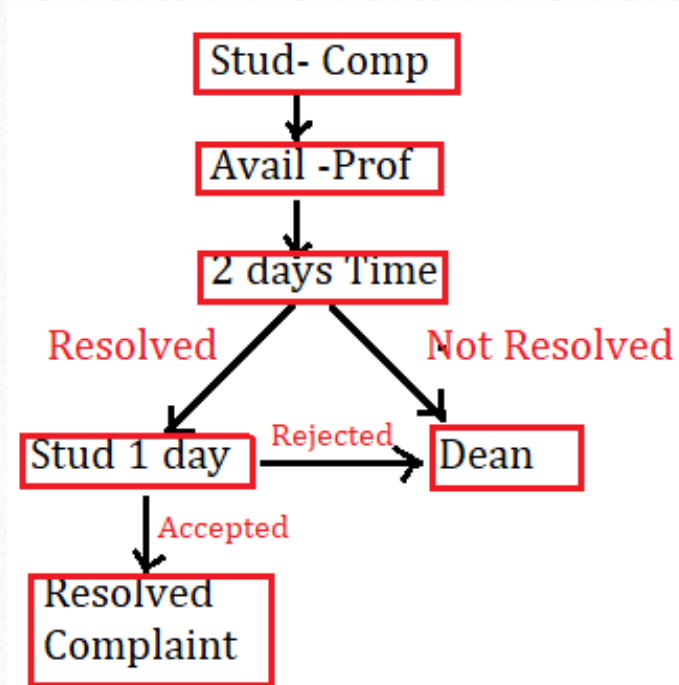
ABC University is a renowned educational body in US, where students from all over the world come for study. In the recent past they observed a downward trend in the number of enrollments (70,000 enrollments 3 years back and now it is 40,000). University observed that there is growing dissatisfaction amongst students and the reasons are beyond their perspective

Now you are being called to provide an Academic Complaint system where in students can lodge complaints through the existing university portal and these complaints could be resolved. All the professors' act as mentors and the respective professors allocated to each complaint will interact with students and resolve the problem. End of the day the chief mentor should be able to query the system for no. of complaints resolved successfully to take strategic decisions for the betterment of the university

ABC University - CaseStudy - Guidelines 1



ABC University -- Page Designs



Student Login

FAQs - Raise Comp - History

Complaint

Max 2000 char

Save

Post

Complaint 1 - Resolution
Complaint 2 - Resolution
Complaint 3 - Resolution
Complaint 4 - Resolution
Complaint 5 - Resolution
Complaint 6 - Resolution

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**Chapter 7
Requirements
Engineering**

Prof Login

FAQs - Allot Comp - Availability

List of Complaints
Select Complaint

Complaint Text

Student Details

Complaint resolution

Save

Post

Escalate

Prof Availability for next Week

Monday --
Tuesday --
Wednesday --
Thursday--
Friday --

Dean's Login

**Dashboard - Resolved - Escalated - Adhoc
to FAQs Complaints Reports**

Total - FAQs-Resolved- Process - Rejected
120 26 76 22 18

Drill down features

9 Points in mind before asking Questions to Stakeholders

While Asking Questions, We should probe into

1. 5W 1H of that concept (Why, What, Who, Where, When and How) and
2. confirm the Requirement is SMART before accepting it for development.
3. Stakeholder analysis – RACI Matrix
4. 3 Tier Architecture.
 - Application Layer
 - Business Logic layer
 - Database layer
5. UML Diagrams
 - Use case
 - Use case Spec
 - Activity Diagram

9 Points in mind before asking Questions to Stakeholders -2

6. Models – (Design in BABok V3)

Domain Model

Conceptual Model

Data Model

DFD

ER Diagram

7. Screens / Page Designs

8. Sign offs (Confirmations) should be taken on all Documents, Diagrams, SDLC Stages from responsible Stakeholders.

9. Any Information which you gather should fit into any of sections (4,5,6,7) described, otherwise it is just an information or a non-functional requirement

BA Maturity in asking Questions - Checklist

3 Tier Architecture

Application Layer
Business Logic layer
Database layer

UML Diagrams

Use case
Use case Spec
Activity Diagram

Models – (Design in BABok V3)

Domain Model
Conceptual Model
Data Model
DFD
ER Diagram

Screens / Pages design information

ABC University
Case Study

Prepare your Page
Designs
Write 30 Questions
% of Info Gathered

Requirements Elicitation - Responsibility

**As a Business Analyst, kindly
understand that
we are trained to extract requirements
from the Stakeholders
and
the Stakeholders are
NOT Trained to share requirements
with the Business Analyst.**

Requirements Management

Requirements Management is all about processing the elicited requirements to implement the most suited solution.

Requirements tracing, a process of documenting the links between the requirements and the work products developed to implement and verify those requirements

1. Requirements Communication
 - 3R Concept
2. Requirements Management
3. Requirements Organization
 - Requirements Definition
 - Requirements Modeling
 - Requirements Verification

Solutions Evaluation & Implementation - UAT

1. Business Solutions
2. Solution Assessment
 - Assess proposed Solutions
 - Requirements Allocation
 - Organizational readiness Assessment
3. Solution Validation
 - Verification Vs Validation
4. Solution Evaluation
5. Solution Implementation

Validation – If the solution is right
for the product

Verification – if the Solution
delivered right product

Enterprise Analysis - Introduction

- Enterprise analysis (also known as strategic enterprise analysis or company analysis) is defined as focusing “on understanding the needs of the business as a whole, its strategic direction, and identifying initiatives that will allow a business to meet those strategic goals.”
- Enterprise analysis involves a thorough examination of not only the business problem (need) and its proposed business solution (if one already exists), but also an in-depth look into whether the proposed solution is truly the best solution, a detailed analysis of what the solution entails, its risks, and its feasibility in the existing organizational climate.

Scenario – IT Company – Payroll
2 Clients – ADP , Airtel

Context of the Requirements /project - Decision Making

Analysis

Understanding the positives and negatives of a concept with respect a reference

Base of Analysis - Comparisons

SWOT

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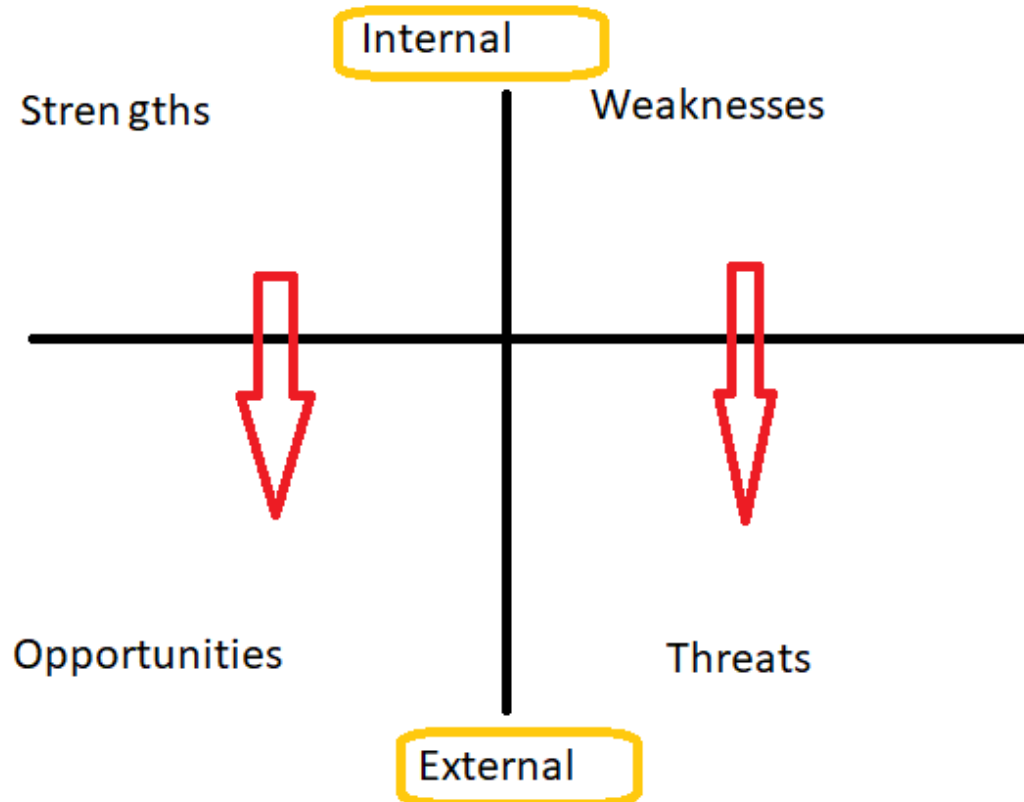


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SWOT



SWOT Analysis

Please do SWOT
analysis on
Getting a BA Job

SWOT Getting a BA Job

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SWOT Analysis

Getting a BA Job

Strengths

BA Skills
Good Resume

Weaknesses

Unable to give TIME
Diluted Focus on this BA initiative

Opportunities

BA Job Market
more BA openings

Apply for jobs
shortlisted
attending interviews

Threats

Negative Thought Process

GAP Analysis

Understand Business Process

Identify Problem Areas

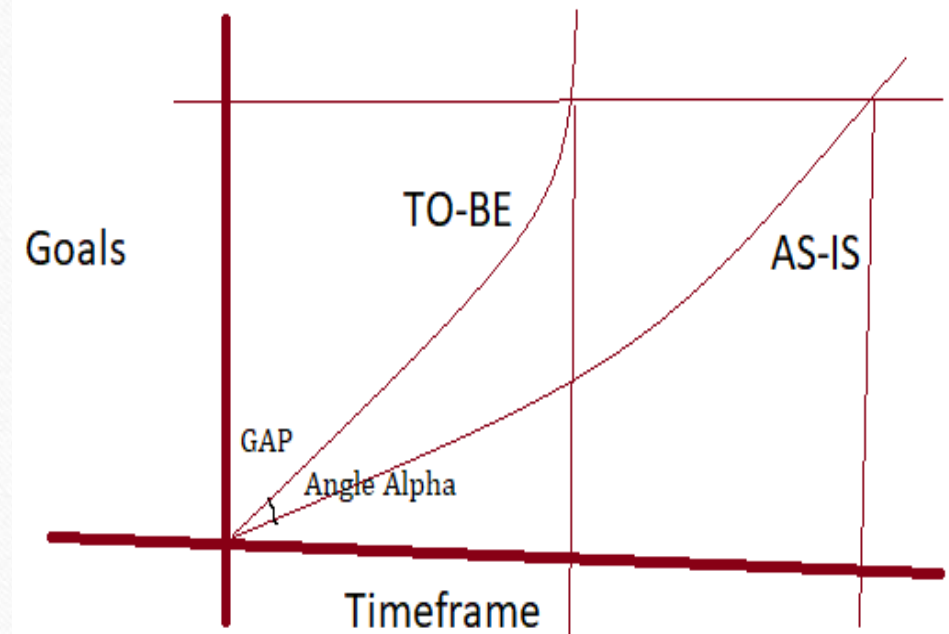
Limitation Areas

Improvement Areas

Opportunity

IT Solution

↓
Benefits List



Feasibility Study

Possibility of doing a project within some constraints like Technology, Budget and Time.

Idea - Can it be turned into technology?

Estimate the Solution Building cost

Prove that it can be done

Possibility of doing a project

1. Technology

HW

SW

Trained Resources

2. Budget

3. Time

Root Cause Analysis

An event which hinders the smooth flow of the process is termed as an issue and the reoccurrence of the same event over a period of time is termed as problem.

Workplace – Facing a problem
Experiencing the surface of the problem
Solution at this level – Temporary
Permanent Solution – You have to find the root of that problem

RCA Techniques

- ❖ 5 Why
- ❖ Tabular Method
- ❖ Fishbone Diagram

Tabular – start a Restaurant - Design
Problem in Bill – Compare the actual process
with the defined process

Fish Bone Diagram

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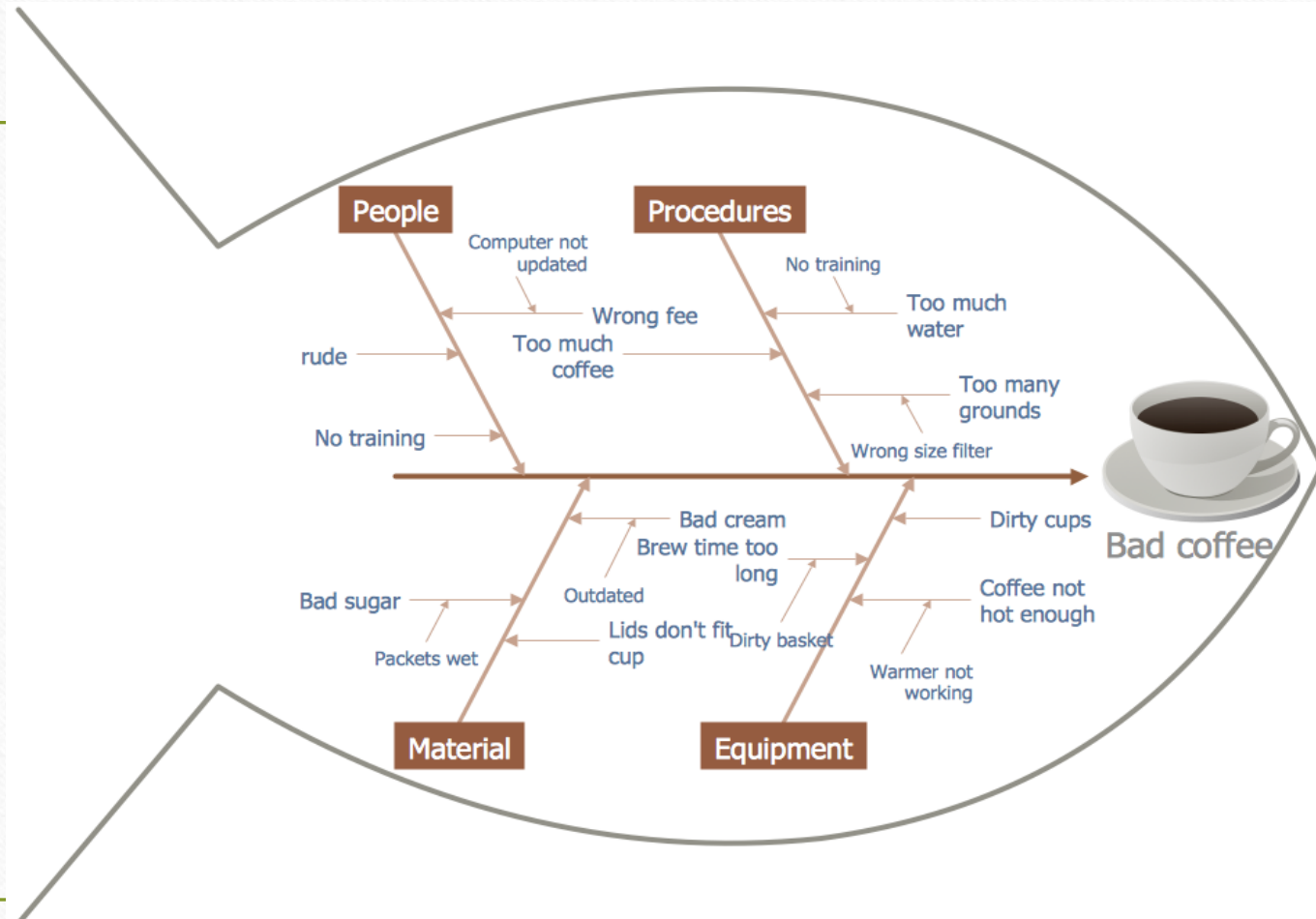


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The Root Cause Analysis Process is also known as the “Ishikawa Diagram,” the “Fishbone Diagram,” “Cause-and-Effect Diagram.”

Ishikawa identified five (5) key areas
People – Processes – Machines
– Materials - Environment

Bad Experience at
An Airport
A railway station
A Bus Stand



Decision Analysis

Decisions and their resulting outcomes can be either financial or non-financial in nature.

- **Financial factor like Company turnover, quarter wise turnover, budget allocation for new project etc.**
- **Non Financial factors like required skill set to do project, infrastructure, right resource to do the project etc.**

Strategy Understanding

Strategy is the direction and scope of an organization for the long-term, which helps in getting profits for the business or units through its implementations.

- How to do it?
- What to do it?

Effecting Factors

- **External Environment Factor**
 - PESTLE Technique
 - Porter's Five Force Model
- **Internal Environment Factor**
 - MOST Analysis Technique

Strategy	Cost of Coffee Ambience Staff	Coffee Days Rs 200 Good Well trained	Coffee Shop Rs 30 Average ok to manage
		Service serve Coffee as a part of their Service Hangout Places Conference rooms	Product Selling

Enterprise Architecture Frameworks - 1

- **Zachman Framework**
is used for bigger organizations.
- **POLDAT Framework**
is used for smaller organization.
- **TOGAF Framework**
The **O**pen **G**roup **A**rchitecture **F**ramework.

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Zachman Frameworks

	DATA <i>What</i>	FUNCTION <i>How</i>	NETWORK <i>Where</i>	PEOPLE <i>Who</i>	TIME <i>When</i>	MOTIVATION <i>Why</i>
Objective/Scope (contextual) <i>Role: Planner</i>	List of things important in the business	List of Business Processes	List of Business Locations	List of important Organizations	List of Events	List of Business Goal & Strategies
Enterprise Model (conceptual) <i>Role: Owner</i>	Conceptual Data/ Object Model	Business Process Model	Business Logistics System	Work Flow Model	Master Schedule	Business Plan
System Model (logical) <i>Role: Designer</i>	Logical Data Model	System Architecture Model	Distributed Systems Architecture	Human Interface Architecture	Processing Structure	Business Rule Model
Technology Model (physical) <i>Role: Builder</i>	Physical Data/Class Model	Technology Design Model	Technology Architecture	Presentation Architecture	Control Structure	Rule Design
Detailed Representation (out of context) <i>Role: Programmer</i>	Data Definition	Program	Network Architecture	Security Architecture	Timing Definition	Rule Speculation
Functioning Enterprise <i>Role: User</i>	Usable Data	Working Function	Usable Network	Functioning Organization	Implemented Schedule	Working Strategy

POLDAT

- Process
- Organization
- Location
- Data
- Applications
- Technology

Scope - In-scope, Out-of-scope

A Business Analyst should model and define scope in a way that it provides enough details to address the business need and capabilities. This will help stakeholders to visualize the solution and understand how the solution will deliver the required capabilities.

In-Scope: These statements define what components, capabilities, interfaces, organizational units and processes are included in solution. If a solution is implemented in phases or iterations, the In-Scope statements should be described with respect to each phase or iteration.

Out-Of-Scope: These Out-Of-Scope items can be identified by visualizing the bigger picture and taking off items which are somehow related to the solution but are not covered in the scope. These can also be potential requirements which can become a part of the scope in future.

Business Case

A business case is a package of information, analysis & recommendations.

A business case is prepared by Sr. BA, Business Architect & Pre-sales team.

A business case also helps in identify key stakeholders who are affected by the problem.

- Why is this project initiated?
- What are the current problems?
- With this project how many problems could be solved?
- What are the resources required?
- How much organizational change is required to adopt this technology?
- Time frame to recover ROI?
- How to identify Stakeholders?

Enterprise Analysis - Strategy Analysis

Strategy Analysis (Previously known as Enterprise Analysis)

- Analyse the current State
- Define the Future State
- Assess Risks
- Define Change Strategy

Daily BA will do Strategy Analysis to drive everyday's BA Contribution

Change Request

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Role of BA in handling Change Request

CR - Defect - Prev Installation
Bug - Support Team

CR - Impact Analysis
Feasibility Study
Effort Estimation

PM Approval
log this CR into Change Tracker

CCB -
Change Control Board

ATM
Rs 100 Rs 500
CR - to add Rs 200

Search Doc Area
100 500

3 Documents
60 Times

Change
10 Minutes
60*10
600 Minutes
10 Manhours

Search Code
100 500
C D

5 Programs
70 Times

Change
4 Manhours
70*4
280 Manhours

10 Manhours
290 Manhours

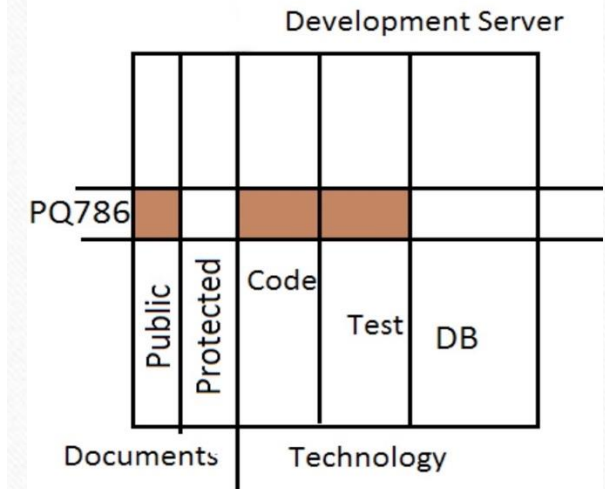
Impact Analysis - 3 Documents
5 Programs

Feasibility Study - 1. IT Company - 5 programs
2. Change is possible
3. Technical Skillset

Effort Estimation - 290 ManHours

PM Approval -

Prepare
5 Change Requests



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Changes - Current n Previous Work process

Please note CHANGES that happened in your current, previous work processes... of your jobs...

This will help us to justify our BA knowledge.

**Business Analysis is a series of change enabling activities...
And a Business Analyst is a change Enabler**

Business Rules , Business Requirements

Business Rules

Bus Req Functions under the scope of Business Rules

Business Rules

1. Organisation Rules
2. Governance Rules
 - 2.1. Process or Domain Governance
 - 2.2. Political Governance

Business Req - Withdraw Cash from account

Business Rules

1. Banking Hours
2.
 - 2.1. RBI - max 10k withdraw
 - 2.2 Regional Holidays - Banking Windows - influence

RTM - Requirements Traceability Matrix

					D1 T1 D2 T2 D3 T3 D4 T4						
Requirement ID	Requirement	Requirement Description	Category	Sub-Category	Design	Code	UT	CT	ST	SIT	UAT
PQ786 FR0001	Login	Login will have Username and Password	Security	User Security	YES						

Each Cell may have Either Yes or Tick mark.

1. Document name

2. Header name

3. Citation

(first three words, last three words)

4. Page Nos

5. Location of Document

6. Associate ID

7. Date of handle

1. PQ786ADDV1D1.docx

2. 3. Security

3. All Users should
Security is achieved

4. 27,28,29,30

5. //PQ786/Design/

6. SMBS030

7. 30 July2018

BA in Traditional Projects

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Stages	Activities	Artifacts & Resources
Pre project	Enterprise Analysis – SWOT Analysis, GAP Analysis, Market Research, Feasibility Study, Root Cause Analysis, Decision Analysis, Strategy Analysis, Enterprise Architectural Frameworks, Project Scope and Business case writing, Risk analysis	Business Case SOW (Statement of Work) PO (Purchase Order) Sr. BA, Business Architects Pre sales Consultants
Planning & Estimations & Assessment Project Kick Off (Big Picture Planning)	Senior Team will visit the Client and understands Client's Business Goals, Business Objectives and Business Rules Plan Packages for Big Projects Stakeholders RACI matrix Suggest BA Approach Strategy - Elicitation Techniques, Communication Channels, Requirements Management, Templates, Documents to follow, Tools to use, Change Requests process	PM Sr. BA

BA – Req Gath, Analysis

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Stages	Activities	Artifacts & Resources
Requirements Gathering	Stakeholder Analysis - RACI, ILS Apply Elicitation Techniques Brainstorming , Document Analysis, Reverse engineering, Focus Groups, Observation, workshops, JAD, Interviews, Prototyping, Questionnaires, Use Case Specs Sort the gathered Requirements (avoiding duplicate Reqs , grouping into similar functionality or into modules) Prioritize requirements – MoSCoW Validate Requirements - FURPS Good Requirements Qualification - SMART	BRD (Business Requirements Document) BA PM
Requirements Analysis	BA will draw UML Diagrams - Use case Diagrams, Use case Specs, Activity Diagrams BA will prepare Functional Requirements from Business Requirements BA Prepares Functional Spec from Functional Requirements Technical Team will SSD from non-functional Requirements BA will add both Functional Spec and SSD to SRS BA will take sign off on SRS Document from the Client SRS is the first legal binding Doc between the Business and the technical Team BA prepares RTM from SRS before Design phase starts. (BA is the owner of RTM). BA traces how requirements are dealt in each phase of development life cycle from Design till UAT	Functional Requirements Specification SSD(Supplementary Support Document) SRS (Software Requirements Specification) RTM (Requirements Traceability Matrix) BA PM Solution-Architect DB – Architect NW – Architect

BA – Design, Coding

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Stages	Activities	Artifacts & Resources
Design	ADD - 3 parts - Architecture of System, DB Design, Page Designs Sol Arch, NW Arch will refer Use Case Diagrams n SRS Doc and will come up with Architecture of the system DB Admin will refer to Entity Classes and SRS Document and will come Up with DB Design GUI Designer will refer to Boundary Classes and SRS Documents and will come with Page designs Once ADD is Prepared, BA will do 3U Update all stakeholders on Design Doc Identify UAT Participants Identify how many types of User Manuals to prepare Updates RTM	Solution Document Design Document – HDD – ADD BA PM Solution-Architect DB – Architect NW – Architect GUI - Designer Test Manger
	Conducts regular(weekly) Status meetings with technical team and the Client BA organizes JAD Sessions - if required BA clarifies queries of Technical Team during Coding Interacts with UAT participants Updates End user manuals Updates RTM	LDD – CDD Application Development Team BA PM

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Stages	Activities	Artifacts & Resources
Testing	BA- Prepares Test Cases from Use Cases or assists Test Manager BA performs high level testing BA prepares Client for UAT Requests scrambled Test Data from Client for pre-UAT n UAT purposes Takes signoff from Client on Client Project Acceptance form Updates End User Manuals Updates RTM	Test Concerning Documents Application with less errors Testing Team BA PM Client
Deployment and Implementation	Forwards RTM to Client or the PM which should be attached to the Project Closure Document Coordinates to complete and share End User Manuals Plans and Organizes Training Sessions for End Users Prepares Lessons learned from this project (to take precautions for coming projects)	Project Closure Document Fit For Support Document Release Engineers Release Managers