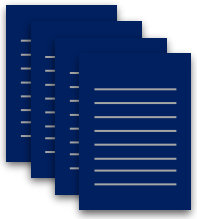
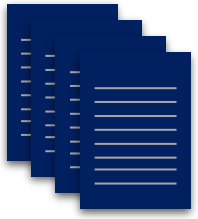
Executive Summary



Current State and Pain-points

- Bank is losing key customer to other banks
  - Due to old IT systems – one for each product type hence unable to recognize a valuable customer for touchpoint
- The IT division is not able to respond to bank quickly again due to legacy technology and slow-paced changes .
  - Hence unable to launch new products quickly
- Complaints around reliability and security of the current systems .
- Internet banking provides only basic capabilities
- Loan origination process takes more than 7 days
- Cost of launching mobile banking is very high



Vision

Bank envisions being more agile and flexible in order to provide more innovative products to customers, increase customer loyalty and be more profitable with 60% of current IT budget

Solution Element from Bank's IT division

Bank's IT division has decided to adopt Service Oriented Architecture to achieve this business goal

Requirement Analysis

Key Asks : Revamp and introduce new services in internet banking

- Bill payments for utilities, Mobile phones and land lines of multiple telecom providers
- Fund transfer within the same bank's accounts and to other bank's accounts
- Generating transaction report
- Pay credit card bills
- View Demat account details in terms of value of investment as on the current date
- Request for cheque books
- Stop cheque payments
- View & update email and SMS alerts on various transactions with configurable thresholds

Key Asks : Omni-Channel

Services to be available in mobile, atm and internet banking

Key Asks : Build a new loyalty management system

Rule driven system to enable loyalty for HNIs

Key Asks : 360 Degree view

Bank wants 360-degree view of customer across all the account types; Savings account, Current account, fixed deposits, Recurring deposits & Demat account

Key Asks : Mobile first

- Bank wants to provide internet banking services to all major phones.
- Due to regulatory reasons any services related to trading won't be available on mobile
- Reuse capability from Internet banking

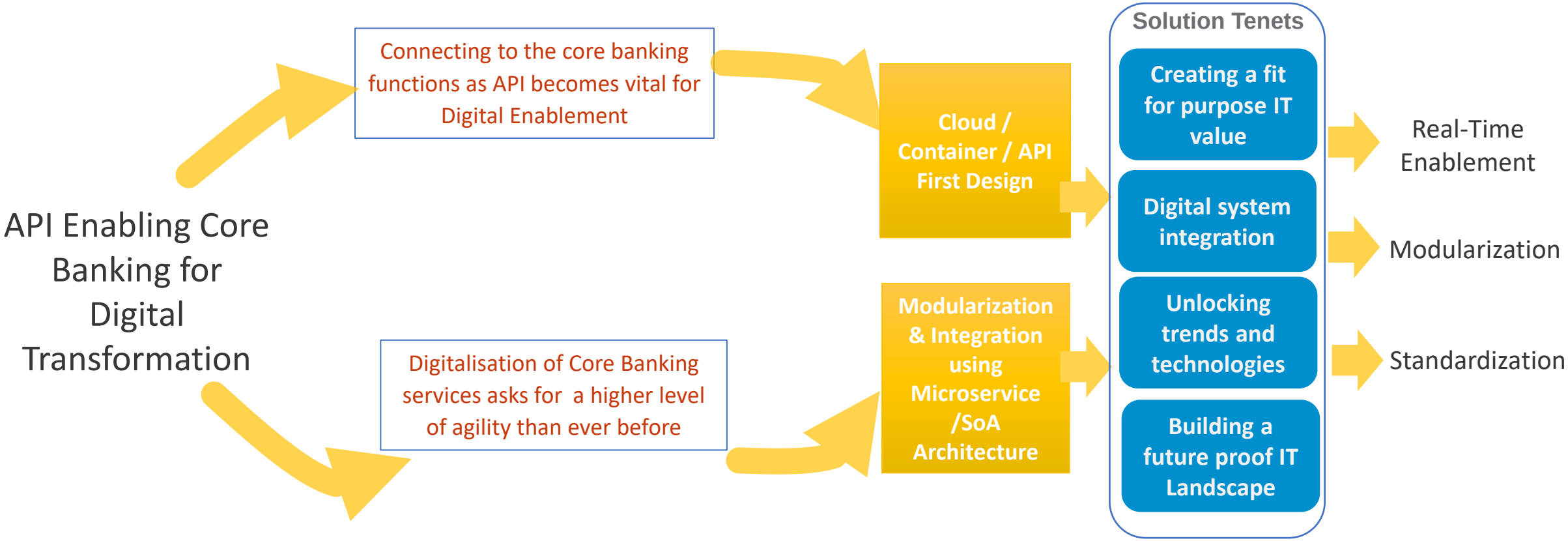
Key Asks : New LOS to reduce lead time to 2 days

- Apply new loan over internet
- Workflow to apply loan, upload doc and approval by banks
- Dashboard capability to see stats on # of loan applied, application approved, SLA validation,etc

- Solution Approach
- Logical & Technical Architecture
- Create a SOA Reference Architecture for the bank indicating the following:
  - All the services at different granularity
  - All external and internal systems
  - All channels showing how they would interact with the service layer
- High level contract for at least one business service

Solution approach using Cloud, Api and Microservices architecture

Ask - Provide a high-level solution approach



Details of Solution Tenets

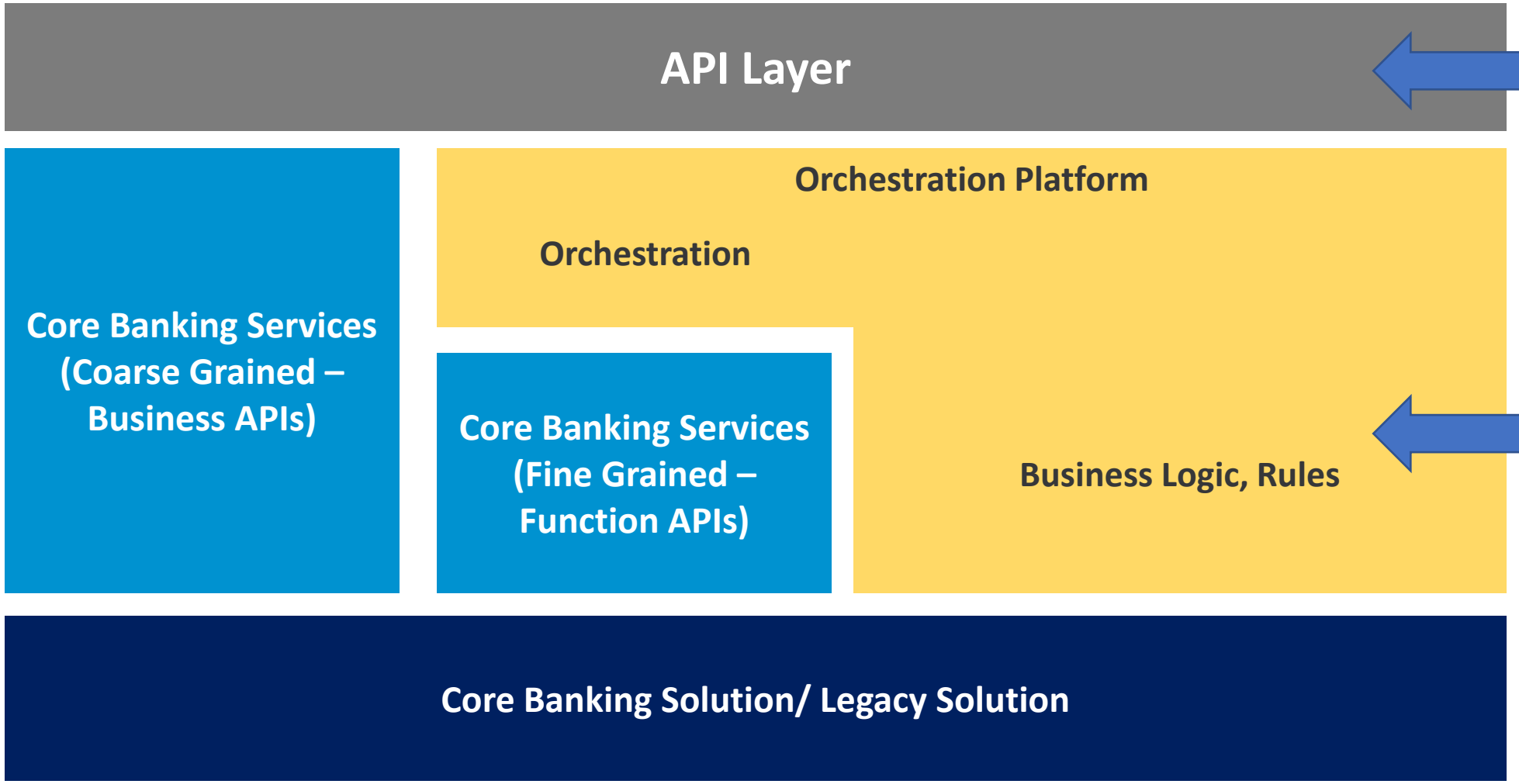
Ask - Provide a high-level solution approach- *Highlights quicker turnaround time*

Creating a fit for purpose IT value	• **Building microservices to decompose monolithic applications**** • **Isolate processing logic with data**** • **Deploying on cloud platform in a "cloud native" way****
Digital system integration	• **Interfaces to be well defined and exposed through internal & external API gateway.**** • **Well defined security guidelines for external consumers of the services****
Unlocking trends and technologies	• **Introduction of Event Driven Architecture** • **Service Mesh to facilitate faster, safe and reliable service communication**** • **Leverage containerization and dynamic orchestration** • **Ensure container portability to avoid vendor lock-in**** • **Compliance to SOA 2.0/OpenApi 3.0 standards****
Building a future proof IT Landscape	• **Design for fault tolerance, high availability, message reliability** • **Auto scaling as well as individual service level scale-up** • **Optimisation and Caching of application processing for high performance** • **DevOps and cloud native monitoring systems enabling fail and recover faster**

***Being covered in subsequent slides*

Logical Api Architecture

Ask - Provide a logical API/SOA architecture



Core Banking API Catalogues

- Definitive list of core API
  - Well Defined Patterns for Customer, Accounts, Payment API
  - Developer Portal Customization Framework

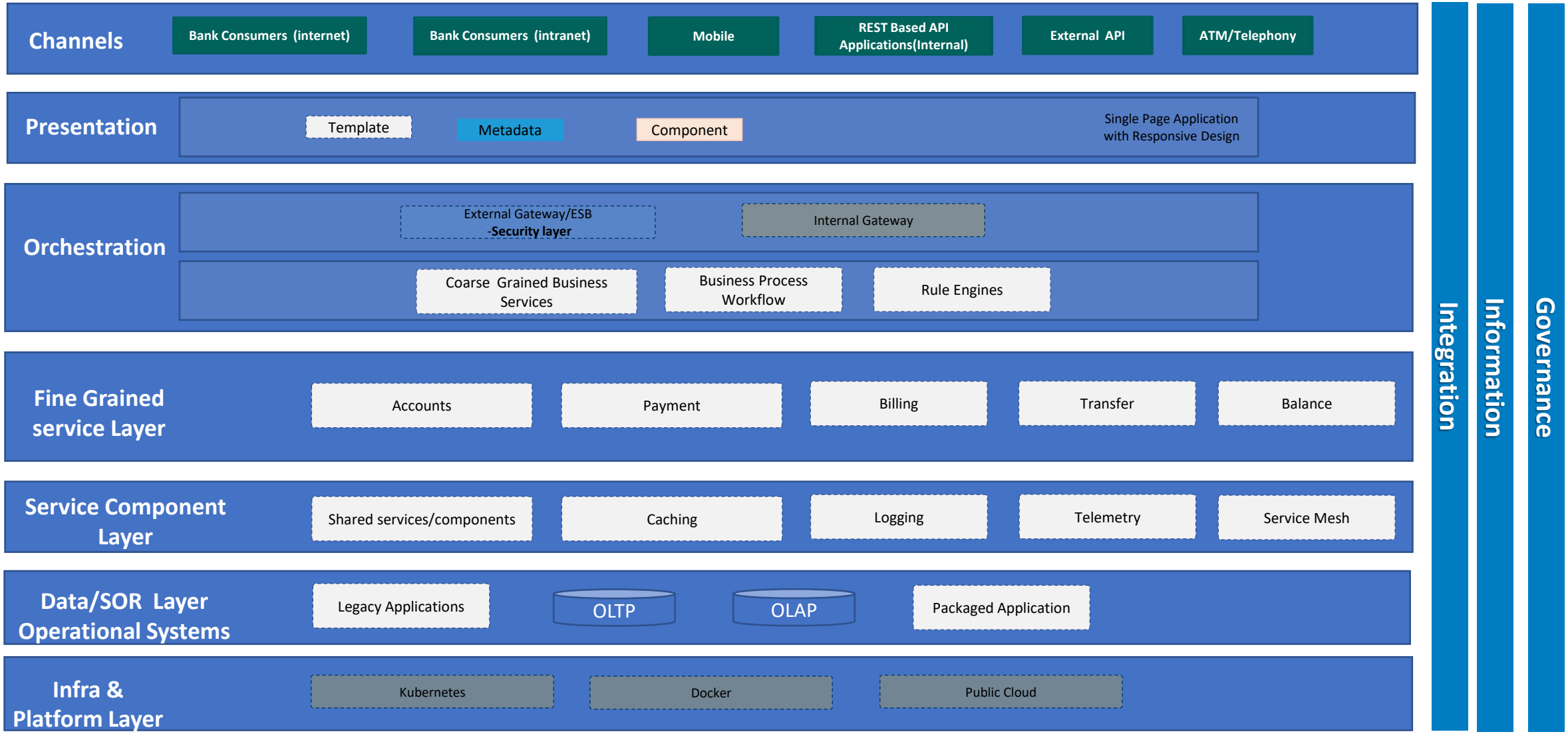
Service Layer

Components for Micro-services platform

- Aligns completely cloud native design
- Orchestrating between functional and business services

SOA Reference Architecture

Ask - Provide a SOA/ Microservices / API reference architecture

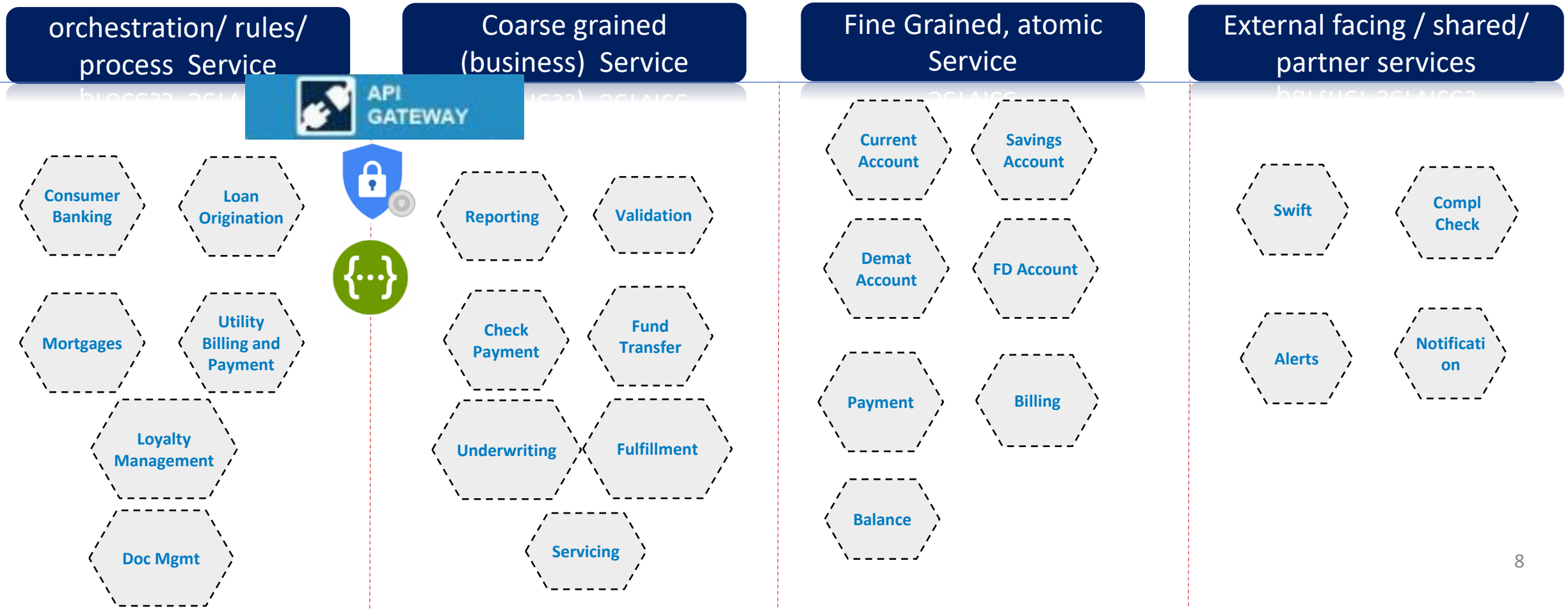


Components, APIs and Microservices

Ask - Provide Services at different granularity– (a) coarse grained business api (b) Fine grained functional api (c) Business service layer (d) External facing services

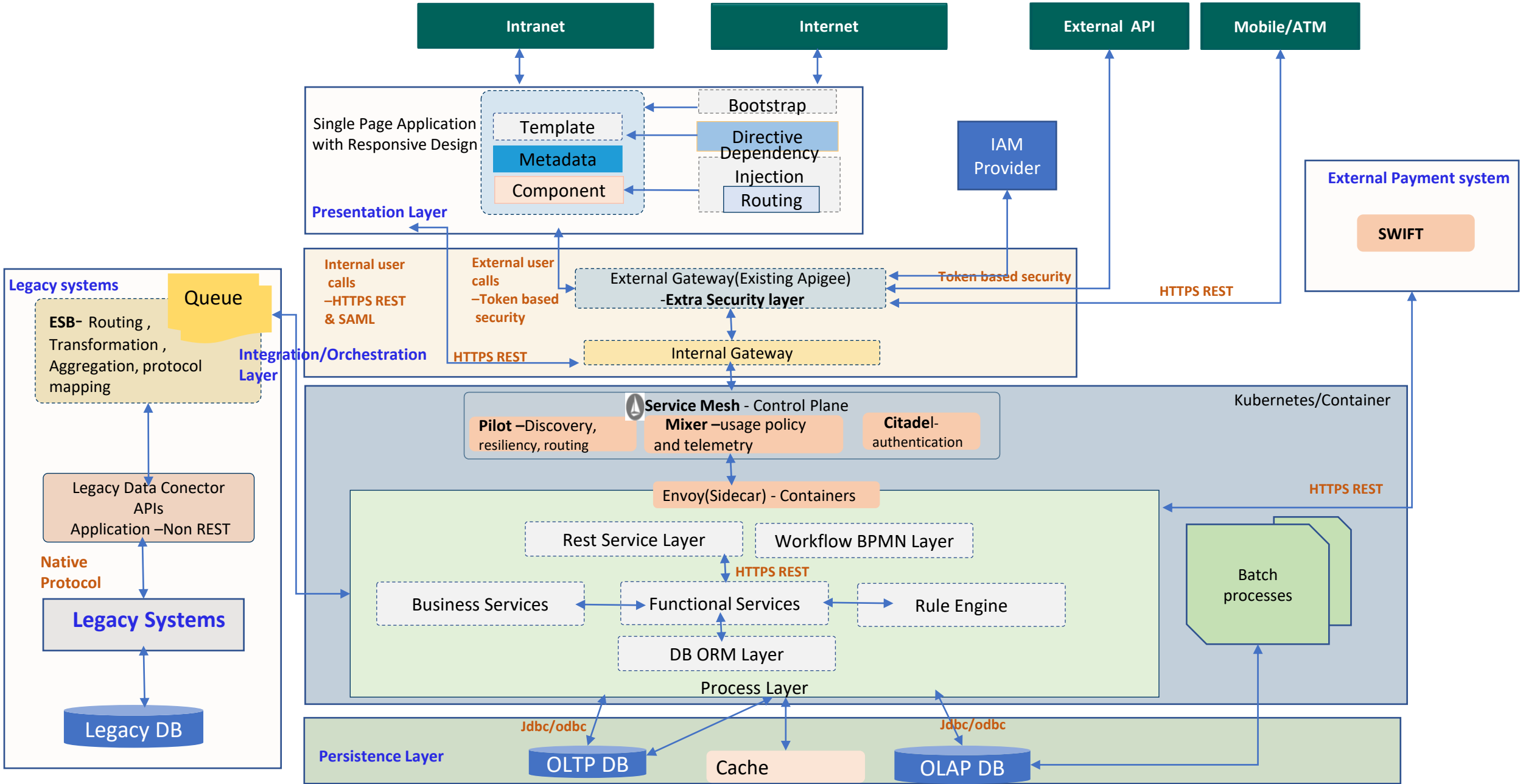
Key Principles Used In Arriving at Specific Services & Components

- Organized Around Business Capabilities
- Domain Driven
- Smart Endpoint and Dumb pipes
- Decentralized Governance
- Decentralized management
- Containers and devops to design for failure



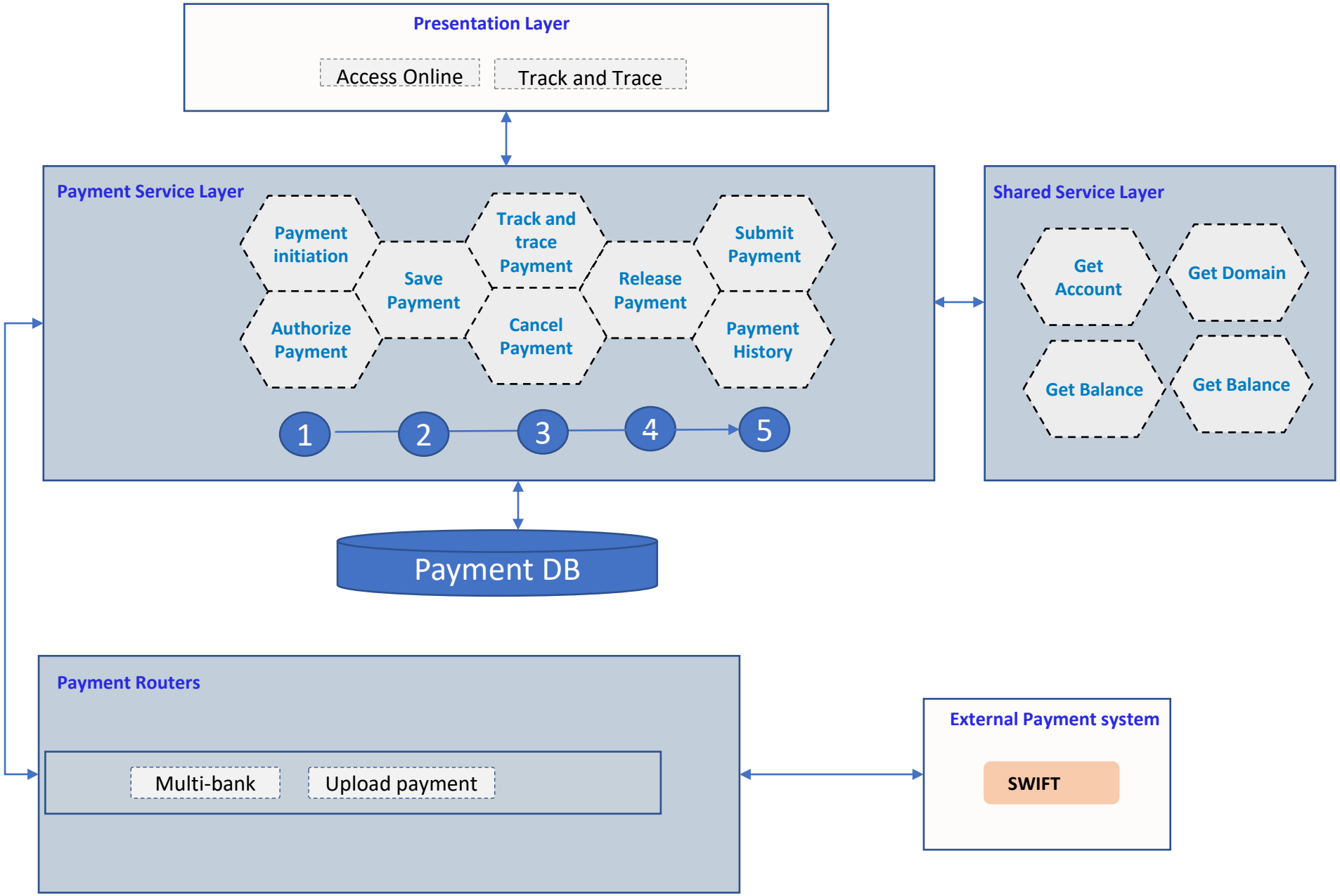
Technical Architecture … Following cloud native principles.

Ask – a) Show All external and internal systems b) Show All channels showing how they would interact with the service layer



Indicative Payment Information architecture

Ask – a) Show All external and internal systems b) Show All channels showing how they would interact with the service layer



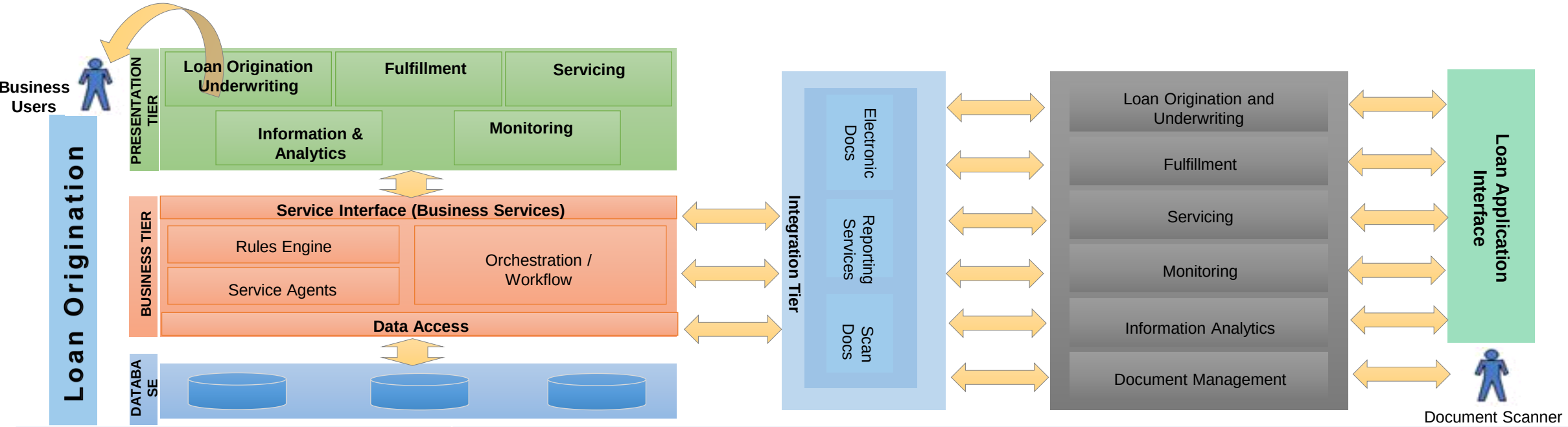
Indicative Payment Service Catalogue

Ask - Provide Services at different granularity.

Sample Payments APIs	Payment initiation services (all payment types)	➢ Initiate Payment ➢ Cancel Payment ➢ Update Payment ➢ Get Payment Audit Details ➢ Download Payment Overview ➢ Download Payment Detail ➢ Authorize Payment ➢ Release Payment
	Batch payment initiation	➢ Initiate Batch Payment ➢ Cancel Batch Payment ➢ Update Payment ➢ Get Batch Details ➢ Get Transaction Details ➢ Get Payment Audit Details ➢ Download Payment Overview ➢ Download Payment Detail ➢ Authorize Payment ➢ Release Payment ➢ Upload Payment File ➢ Accept Payment File ➢ Validate Payment File ➢ Get Payment File
	Payment status	➢ Get Transaction Status History ➢ Update Payment Status ➢ Get Payment File Status ➢ Payment Track & Trace

New Loan Origination System

Ask – Bring down the loan origination process from 5 days to 2 days



Process	Key consideration
Origination & Underwriting	**Consolidate od Origination and underwriting systems**- Implement a common loan origination and Underwriting platform that would support multiple product streams
Fulfillment	**Reduce manual errors and streamline process** – Use automated orchestration and workflow solutions to reduce manual errors and introduce straight thru processing.
Monitoring	**Automation of Monitoring processes** – Build real-time Monitoring solution that would cater to all products, design and integration of various data streams into data marts and creation of reporting platforms . This will enable real-time fraud detection.
Analytics	**Build the Analytics foundation -** Create data marts and built analytics platforms for providing a consolidated exposure of clients. Build sales and service analytics platforms for commercial banking products
Client On-boarding	**Changing KYC and AML requirements-** Implement a common client onboarding platform that provided superior capabilities for meeting compliance changes.

Security considerations

Ask – How to ensure security and reliability of APIs

Security for Exposed API

- Use API gateway/ ESBs to ensure security
- Use oauth2.0 based jwt token/key validation for ensuring API security
- Use proper policies for API security
- Use secure transport layer for encryption and secure data at REST/motion
- Use OWASP top 10 security guidelines and integrate with DevSecOps(input parameter validation)
- Use web access firewall

Security for Internal API

- Use Istio security mechanism for intra service communication
- Use maTLS security mechanism for internal API communication
- Use OWASP top 10 security guidelines and integrate with DevSecOps

High Level Contract for at least 1 Business service.

Ask – Lets see a sample Transfer fund busines service contract


```
{
    "openapi": "3.0.2",
    "info": {
        "title": "New API",
        "version": "1.0.0",
        "description": "For solving a problem!"
    },
    "paths": {
        "/fund/v1/transfer": {
            "summary": "Transfer fund  within bank accounts",
            "post": {
                "requestBody": {
                    "content": {
                        "application/json": {
                            "schema": {
                                "type": "string"
                            }
                        }
                    },
                    "required": true
                },
                "parameters": [
                    {
                        "name": "fromBankAccNum",
                        "description": "",
                        "schema": {
                            "type": "number"
                        },
                        "in": "query",
                        "required": true
                    },
                    {
                        "name": "fromBankName",
                        "description": "",
                        "schema": {
                            "type": "string"
                        }
```


fund-transfer-openapi-spec.json

360-degree customer view

Ask – How to achieve 360-degree customer view

- Have an optimal mix of componentization granularity and API based integration of components
- Use Open API standards for co-innovation with the external ecosystem.
- Use cloud first strategy for hosting applications and conform to cloud native standards
- Use real-time solution that processes and posts transactions in real-time, on own and third party channels of
- origination including social media channels as well Google Wallet, etc.
- Provide computational user experience driven by user behavior.
- Follow customer centric product design.
- Provide self service capabilities for customers w.r.t opening FD, check order, investment
- Use analytics to provide customer insights through customer journey
- Provide AI based customer experience with merchant services like hotel booking, car booking, movie ticketing , etc.
- Use AI/Robotic process automation to cut down expenses,