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SYSTEM ANALYSIS DESIGN OF CELL FIN APP OF ISLAMI BANK BANGLADESH PLC

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Abstract:

System Analysis Design and algorithm helps business and organization in various ways. System analysis and design assists companies identify in-competencies, streamline procedures, as well as upgrade overall productivity.SAD and algorithm helps in understanding complex structures, better management of changes, alignment with strategic priorities, reduced IT issues, improved data analysis and decision-making, integrated view of the organization, consideration of client needs, software solutions that facilitate data collection etc. Modern algorithms can help businesses in many ways, including decision-making, enhanced customer experience, fraud detection, increased efficiency, predictive analytics, competitive advantage, advanced data analysis etc. In this research the author explain how system analysis design and algorithm helps in understanding the complex function of the new product of Islami Bank Bangladesh PLC the Cell Fin app. Islami Bank Bangladesh PLC launch a new product name Cell Fin by which customer can opened account by using smart phone and national identity card. SAD and algorithm are applied smoothly in the function of Cell Fin explained in this research.

Key Words: System Analysis Design, Cell Fin, Flowchart, Entity Relationship Diagram, Feasibility Analysis.

Introduction:

System Analysis Design analyzes the business needs and integrates technology into the organization by designing and utilizing models and methodologies to simulate deployment, key behaviors. System Analysis Design of an organization distinguishes between outcome (what the system needs to achieve) and output (what the system does). In the technological span of time, the design/format of a Cell Fin App is a judgmental feature of service of any bank industry; it not only influences user experience but also the development of a service-providing company. This research inspects the extensive guide to designing a Cell Fin App for its systematic use. From empirical and pointless concern to low-level and High-level design, the author investigates into each angle with a focus on directness and productiveness.

The system of any organization is developing and improving through System Analysis and Design (SAD) in a structured approach .SAD encompassing both technical and managerial aspects of any organization. A business organization is designing new systems by System Analysis and Design or enhancements to meet specific objectives. System analysis design of an organization helps in analyzing existing systems, identifying areas for improvement, and designing new entity relationship.

System design of an organization is the approach to realize design and organize the flow of value from several aspects of this organization through the value chain to make certain synchronicity, consistency, integration, as well as maximization between people, activities, processes, policies, places, and resources.

The action of business systems analysis involves detecting and then investigating the component/ parts of an organization, for the purpose of acquire information regarding how the organization activities and the association between various tasks, jobs, people, structures and other elements. In this research the author design the algorithm of Cell Fin app of Islami Bank Bangladesh PLC and also explain how System Analysis Design helps in designing the function of Cell Fin app and the entity relationship of this app.

Objective of the Research:

- To analysis the System Analysis Design of Cell Fin app of Islami Bank Bangladesh PLC.
- To interpret the entity relationship of Cell Fin app of Islami Bank Bangladesh PLC.
- To evaluate the data flow diagram of Cell Fin app of Islami Bank Bangladesh PLC.

Research Questions:

- What extend the Cell Fin app of IBB PLC smoothly operates the banking function of IBB PLC?
- What extend the Cell Fin app of IBB PLC reduces the hazard of manual account open?
- What extend the Cell Fin app of IBB PLC attains the five factors of feasibility analysis?

Literature Review:

In the fields of science, information technology, and adeptness, the issues of systems is of much importance. As systems became more complicated, the traditional method of problem-solving became inefficient. System analysis is to examine a business problem, identify its objectives and requirements, and then design the most optimal solution to fulfill those needs.

System Analysis:

It is the extremely initial step in any system development and the vital period where developers come together to recognize the complication, requirements, as well as purpose of the project.

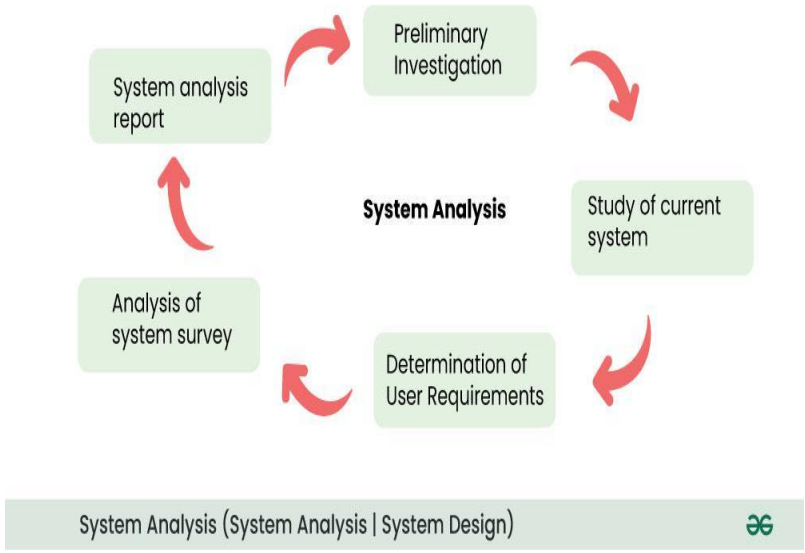
Some of the prime aspects of system analysis are:

- Problem Identification: The problems which the system is pointing to mark are find out in this step. Therefore it is systemating a trade direction, upgrading data management as well as developing the user experience, realizing the difficulty is the initial and crucial step.
- Requirements Gathering: Once the issue is find out, the next step is to gather and record the prerequisite. This pertain to liaising with the clients and developer to congregate information about how the system is to be outlined.

- Feasibility study: Before going into expansion, it is essential to examine the feasibility of the project. This involves the assessment of technical, operational, and financial perspective to determine the feasibility of the recommended solution.
- Analysis and modeling: To obtain a intense perception into the system, analysts develop numerous models, such as Data Flow Diagrams (DFD), Use Cases, and Entity-Relationship(ER) diagrams. These models assist the clients to visualize the system and its interactions.
- Scope Definition: Defining the scope of the system is essential to stop attaching imprudent attributes to the system and make certain that the project continues within its limits. It point outs what is part of the system and what is not.

Example:

There are many examples of System Analysis Design such as fraud detection systems, analyzing transaction patterns and inconsistencies in financial data to develop algorithms for disclosing and stopping fraudulent activities as well as set up algorithm for new service and financial app.



System Analysis (System Analysis | System Design)

System Design:

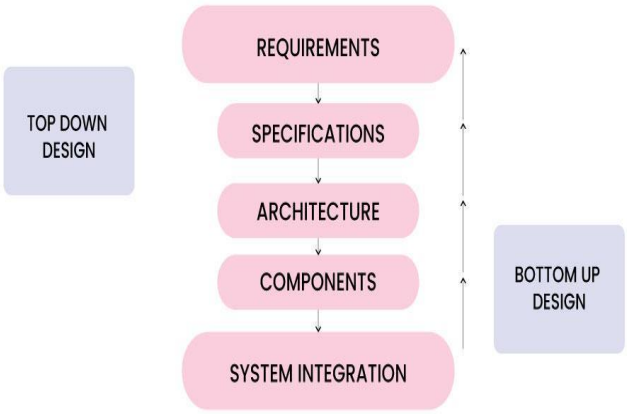
The blue print of a project is created by System design. It implicate converting the prerequisite point out in the inspection phase into a visual solution. The prime components of system design are as follows:

- Architecture Design: The high level structure of a system is narrated by architecture design. This involves determining software and hardware components, their connectivity with each other and the general design of the system. Architects draw explanatory designs ensuring scalability, performance, and safety.
- Database configuration: The database configuration phase contains defining the database schema, data storage, and access methods. Data is organized correctly by a data base programmer, as well as that the system can retrieve and exercise data effectively.
- Communication System: Communication controls are significant components of most systems. In this phase, designers generate the system's visual components as well as interactions.
- Algorithm Design: In this phase complex algorithms are designed. Algorithms are the logic or program that makes systems work, as well as their efficiency and exactness are evaluative.
- Security: Data security is a vital concern in today's digital world. Developers ought to map out for security and certainty measures to secure the system as well as its data, for instance encryption, access control, and threat measures.
- Test and Maintenance: Testing and validation process are planned in this phase. The designer ought to state how the system will be tested to assured that it meets specified concerns and execute as planned.
- Documentation: Appropriate documentation is essential to keep up the system as well as enable future use. Throughout this phase, documentation should be generated or up gradated to make certain that the developer company and end users can access the necessary information.

Example:

Educational Management System and Bank Management System:

- Components: For educational management system the components are Student database, course details, management module, grading system. For bank management system the components are account holder database, banking product / service details, bank management track, profit/loss database.
- Modules: For educational management system the modules are enrollment, attendance tracking, assignment submission, grades. For bank management system the modules are .number of transaction, attendance of staff, profit rate, customer acceptance.
- Interfaces: For educational management system the interfaces are student portals, teacher interfaces, parents portal. For bank management system the interfaces are employee's portal, director's portal, customer's interfaces.



System Analysis (System Analysis | System Design)

What is a System?

A system is a series of steps that act simultaneously as an integrating network to obtain a specific target. The set of components of a system can be hardware, software, employees, customers, stake holders and much more. We are around by system; systems are found in everywhere for example bank management systems which have both hardware and software to carry out definite tasks.

Example:

Biological system, Educational system, Physical system, banking system etc.

Constraints of a System:

Each system works within certain boundaries, which are known as constraints of a system. These constraints determined the limits within which the system can work. Particular constraints contain financial constraints, technical constraints, as well as time constraints, which are significant in conducting program development together functioning.

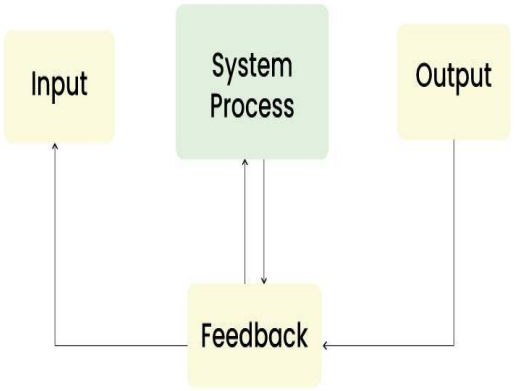
Properties of a System:

Systems exhibit several key homes:

- Interconnectedness: Components inside a device are integrated, alter in one system might cause alteration in the another system.
- Environment: Systems exist within an atmosphere, collaborating with it as well as being influenced through it.
- Boundary: Every systems have a designated frontier that separates them from the exterior domain.. This is necessary for investigating how the system associated with outward surroundings.
- Purpose: Systems are sketched with apparent grounds as well as particular targets. The parts of a system are arranged in such a way to execute deliberated assignments.
- Input and Output: Every systems require input which leads to provide the expected output.
- Feedback: Feedbacks are most significant component of the system as it assists the developers to promote it with the user needs.

Components of a System:

- Input: The data that the device obtains from outward source.
- Process: The activities that take place within the system.
- Output: The consequence after procedings the input.
- Feedback: It is given by the users end to upgrade the system.



Element of a System (System Analysis | System Design)

Types of Systems:

- Open Systems: An open system is the one that collaborate spontaneously alongside the exterior/outer components as well as circumstances. This open systems have the ability to conforming the changes made within the system.
  Example: business organizations, tech company, banking company etc.
- Closed Systems: A closed system is one which is enclosed inwardly itself. The closed systems can not able to do any interaction with the outer environment.
  Example: A computer system.
- Adaptive Systems: Adaptive systems are those that alter their conduct along with the changing environment.
  Example: constantly changing market.
- Dynamic Systems: Dynamic systems are those that alter and move forward over a span of time.
  Example: ecological system change with factors like climate change.

System Models:

Various real world systems are represented simpler by system model. Different complex system are clearly analyze, solved and design by system model. System models are significant mechanism exercise in numerous fields for instance engineering, computer science, economics as well as biology to learning and forecast manners of the system. There are different types of system model, these models can be visual, mathematical or conceptual. System models issue perception into program design, communication as well as development. There are some types of system models frequently used like Mathematical, Simulation, Graphical, Physical, and Conceptual.

Classification of Information:

In the state of affairs of system, records may be classified as follows:

- Operational Information: Day to day operation is executed by operational information.
- Management Information: Managers of an organization making decision utilization of management information.
- Strategic Information: Long term plans and strategies of an organization are made based on strategic information.

Finally, system analysis and design setup the foundation of effective software development as well as problem-solving in various domains. System analysis and design are foundational activities that help us steer/guide the complication of modern systems and to make transformation/revolution in a rapidly changing world.

ER Diagram:

An Entity Relationship (ER) Diagram is a type of flowchart that describes how "entities" for instances people, objects or concepts connect to each other within a system. ER Diagrams are usually to outline or reform relational databases in the fields of software engineering, business information systems, education and research. Entity Relationship Diagram or ER Models have some defined set of symbols such as rectangles, diamonds, ovals and connecting lines to illustrate the interconnectedness of entities, relationships and their quality/traits. ER diagram reflect grammatical structure, with entities as nouns and relationships as verbs.

ER diagrams are connected to data structure diagrams (DSDs), which focus on the connection of elements within entities instead of relationships between entities themselves. ER diagrams also are commonly employed in conjunction with data flow diagrams (DFDs), which prepare the flow of information for processes or systems.

Uses of Entity Relationship Diagrams:

- Database design: Relational databases are designed and sketched through ER diagram. The logic and business rules are determined by a logical data model, as well as the specific technology of a business are implemented by a physical data model. A suitable ER diagram is the first step of any software development. An ER diagram is used in determining requirements for an information systems project of any organization. A specific database later used this ER diagram as a model. An equivalent relational table has belongs to a relational database. This relational table can potentially be expressed that way as required.
- Database troubleshooting: Existing databases are explained by ER diagrams. Logical problem or deployment can be find out or resolved by ER diagrams. Drawing the diagram should disclose where it's going wrong.
- Business information systems: Every business organization requires design and relational databases which can be performed by ER diagram. Any business organization exercise that utilize deploy data requiring entities, actions and interplay can likely benefit from a relational database .ER diagram can well organized procedure , expose information more effortlessly as well as upgrade outcomes.
- Business process re-engineering (BPR): Business databases are analyzed by ER diagram. ER diagrams help in business process re-engineering and in representing a unique database setup.
- Education: Data bases are modern method of keeping relational information for educational purposes and afterwards recovery. Educational data structures planning is very much dependent on ER diagrams.
- Research: Structured data are very much important for research. Many researches are based on ER diagram. ER diagrams can take part a significant role in preparing functional databases to interpret the data.

The Components and Features of an ER diagram:

ER Diagrams are comprised of entities, relationships and attributes. ER diagram also represent cardinality, which refers to association ship in terms of numbers.

Entity:

Entity refers to a definable object for instance a person, object, concept or event. Entity can have data stored about it. Generally entities as nouns such as: a customer, student, car or product. Usually entity represent as a rectangle.

- Entity type: A group of definable objects is called entity type, such as students or athletes, whereas the entity would be the specific student or athlete, entity types are customers, cars or products.

- Entity set: Entity set is a group of objects like as an entity type, but designated at a specific point in time, for example students enrolled in a class on the first day, customers who open account in last month, cars currently registered in a city. For example a linked term is, in which the specific person or car would be an instance of the entity set.
- Classification of Entity: There are three types of entity such as strong, weak or associative. A strong entity can be defined solely by its own traits; while a weak entity cannot can-not defined by its own traits. An associative entity associates entities (or elements) within an entity set.
- Entity keys: An entity in an entity set uniquely defines by an entity key. Generally entity key is an attribute that characterize a specific entity. There are various types of entity such as super, candidate or primary.
- Super key: Super key a set of traits (one or more) that together define an entity in an entity set.
- Candidate key: A candidate key is a minimal super key, which has the least possible number of attributes to still be a super key. An entity set may have more than one candidate key.
- Primary key: A candidate key chosen by the database designer to uniquely identify the entity set is called primary key.
- Foreign key: Foreign key identifies the relationship between entities.

Relationship:

Entities of an entity set act upon each other or are associated with each other. For example, the named customers might register for a service. The two entities would be the customer and the service, and the relationship described is the act of enrolling, connecting the two entities in that way. Relationships are typically displayed as diamonds or labels directly on the connecting lines.

Recursive Relationship:

When the same entity participates more than once in the relationship is called recursive relationship.

Attribute:

Attribute is a property or characteristic of an entity. It often shown as an oval or circle.

Descriptive Attribute:

Descriptive attribute is a property or characteristic of a relationship (versus of an entity.)

Attribute Categories:

Attributes are classified as simple, composite, derived, and single-value or multi-value.

Simple:

Simple refers to the attribute value is atomic and can't be further divided, for example a phone number, an account number, National Identity Number(NID)

Composite:

Composites are sub-attributes spring from an attribute.

Derived:

Attributed is calculated or otherwise derived from another attribute, such as age from a birth date.

Multi-value:

Multi value contain more than one attribute value is denoted, such as multiple phone numbers for a person.

Single-value:

Single value contains only one attribute value. The types can be combined, such as: simple single-value attributes or composite multi-value attributes.

Cardinality:

Cardinality refers the numerical attributes of the relationship between two entities or entity sets. The three main cardinal relationships are one-to-one, one-to-many, and many-many. A one-to-one example would be one customer associated with one mailing address. A one-to-many example (or many-to-one, depending on the relationship direction):

One student registers for multiple courses, but all those courses have a single line back to that one student.

- Many-to-many example: Students as a group are associated with multiple faculty members, and faculty members in turn are correlated with multiple students.
- Cardinality views: Cardinality can be shown as look-across or same-side, depending on where the symbols are shown.
- Cardinality constraints: Cardinality constraints refers the minimum or maximum numbers that apply to a relationship.

Mapping Natural Language:

ER components can be equated to parts of speech, as Peter Chen did. This shows how an ER Diagram compares to a grammar diagram:

- Common noun: Entity type. Example: Customer
- Proper noun: Entity. Example: Abdur Rahim.
- Verb: Relationship type. Example: Account register (Such as in a service/product, which would be another entity type.)
- Adjective: Attribute for entity. Example: Clients.
- Adverb: Attribute for relationship. Example: Technologically.

The database query language ERROL actually mimics natural language constructs. ERROL is based on reshaped relational algebra (RRA) and works with ER models, capturing their linguistic aspects.

Feasibility Assessment:

Algorithm:

The algorithm is a set or program of directions a human or computer implements to do a task. These directions assists to interpret a complicated problem otherwise assist to carry out data computation. Computers should follow these directions to compute or execute systematic actions. They are required for straight forward tasks for instances the multiplication of two numbers or complicated issues looking for an abbreviated substances of folders. Programmers inclined to generate appropriate algorithms so that the problems are solved better. For example, take an example of a traffic signal.

An algorithm has following characteristics:

- An algorithm should be well-defined and well-ordered. The command provided in an algorithm should be easily recognized and explain effectively.
- Algorithm have straight forward operations, such as each of an algorithm's steps should be easily understandable that it may not need any further interpretation.
- It has an fruitfully estimable functioning.

A sensor senses the movement of vehicle, as an output of which could be two outcomes

- Vehicles are moving.
- The vehicles are not moving.

A step that recommends the green signal is lighting pickups the result of the first outcome, while the result of the second outcome is assessed again by delivering it to the first statement. Besides, the output of action, which was the result of the first condition, is tested to check if the vehicles have completely moving. If the answer is yes, green signals are opened; if it is negative, the green signal is remain closed.

Easy Execution of an Algorithm:

We know, algorithm is a scheme for solving a problem. But if we do not have an effective plan, our proposal to solving a complex problem will break down in the first attempt, and even if it solves the problem, possibilities are very less that it will be an perfect solution to that problem.

Furthermore, if we generate an algorithm before solving any problem, let's say we design a few algorithms and sort them out based on the desirable solution they provide, it would assure to solve the given problem. This is the cause why everywhere, before solving any problem, firstly, an algorithm is generated.

Subsets/Building Blocks and Working of an Algorithm:

All these years, it has been proven that it can be designed from just three building blocks:

- Sequence
- Selection
- Iteration

What Can We Do With an Algorithm?

Algorithm is a function or series of activities that solve a particular problem. We can use an algorithm to solve the plain and durable problems in the world. We agree that it is ideal with the help of "time complexity". In simple terms, the time complexity is a way of narrating any given algorithm's run time. There are three types of run time,

- Minimum Run Time (Known as Little 'O'),
- Average Run Time, and
- Worst-Case Run Time O(N) (Also Referred to as Big 'O').

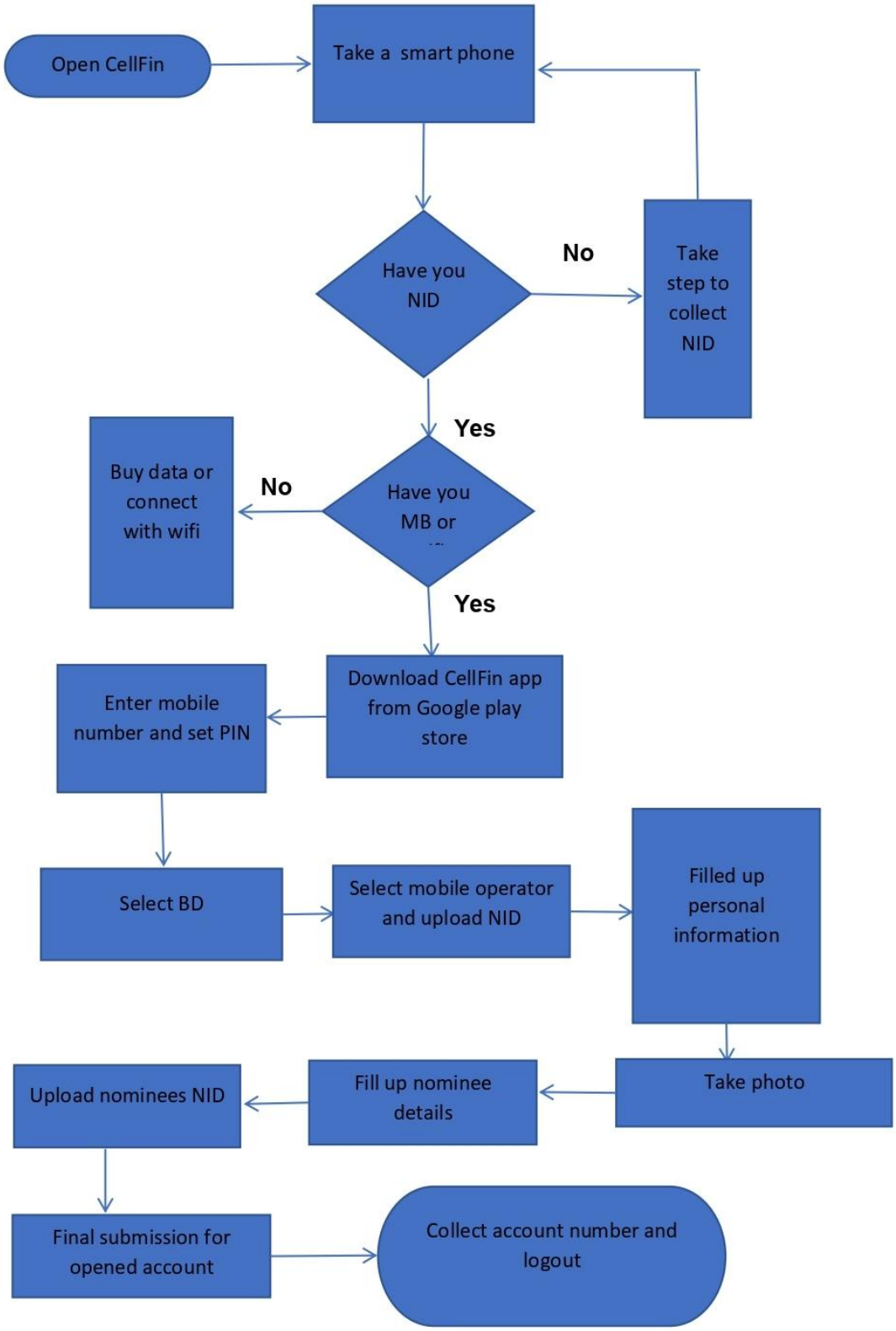
Computer scientists and software engineer prefer to think about algorithms because they are attentive in assessing and constructing collections of best practices so that they don't have to start from scratch on each example of a similar type of problems.

Here discuss an example of different time complexities one might get while solving a specific problem. That also indicates there could be multiple solutions to a single problem, but we must select the most ideal one by calculating the algorithms' time complexities. In interviews, you will be asked to solve a problem, and you will be asked to optimize it, i.e., to lessen your algorithm's running time. As instance, you might have written code with 2 "for" loops (iteration), but it might be possible that the job can be achieved just by using a single "for" loop (iteration), but you have not been up to this solution yet, and you need to figure out more.

System Analysis Design of Cell Fin App:

- Problem Identification: The bank management want to lessen the formalities of account opening system, and make easy to open an account at home premises of customers. Again in earlier opening a bank account is time consuming and need many documents like photo, nominee photo, National Identity card/Passport/ driving license, copy of electricity bill, filled up a long form. So bank management want to set up an app called Cell Fin app, by which customer can opened account through smart phone at their home.
- Requirements Gathering: For opening account through cell fin, the IBB PLC first need to upload cell fin app in google play store. Bank management Link Developer Account with Google Wallet Merchant Account, create application and finally publish the application Cell Fin app of IBB PLC. The requirement to open an account through Cell Fin is a smart phone, data mb or wifi connection, national ID card, basic English knowledge, some technical skill. The bank management communicating with the customer and developer to gather information about how the Cell Fin app is to be designed more effectively.
- Feasibility study: The management of IBB PLC check the feasibility of the Cell Fin App service. They evaluate the technical, operational, and financial aspects to determine the feasibility of the Cell Fin app of IBB PLC.
- Analysis and modeling: To get a deep insight into the service, IBB PLC bank management develop various models, such as Data Flow Diagrams (DFD), Use Cases, and Entity-Relationship(ER) diagrams. These models help the customer to visualize the app and its services.
- Scope Definition: IBB PLC defining the scope of the Cell Fin app .The management of this bank prevent adding excessive features of Cell Fin app and ensure this service works within its limits. The scope of Cell Fin app identifies what is part of the service and what is not.

Algorithm of the Cell Fin App:



Entity Relationship:

An entity relationship diagram is a graphical representation that illustrate the among people, objects, places, concepts or events in an information technology (IT) system. It also known as an entity relationship model.

Mapping an E-R Diagram to a Relational DBMS:

- Generate a discrete relational table for each entity.
- Find out the primary key for each of the relations.
- Establish the attributes for each of the entities.
- Execute the relationships among the entities.
- Find out the attributes, if any, for each of the relationship tables.

To achieve the mapping from an Entity Relationship Diagram (ERD) to relations, we ought to take into account the entity types, relationship types and attribute that are specified for the model.

To find out the relationship among the entities of Data base management System, mapping constraints are executed to ascertained the association of these entities. This is particularly accurate when the system has a condition where one or more entities can be connected to one or more entities in the same Entity-Relationship model.

To generate a mapping diagram, sketch two oval shape and mark the first as the inputs and the second as the outputs (or whatever these are in the scenario). Subsequently draw an arrow from one input value of the first oval shape to its matching output value in the second oval shape; drag on until all input, output values are matched.

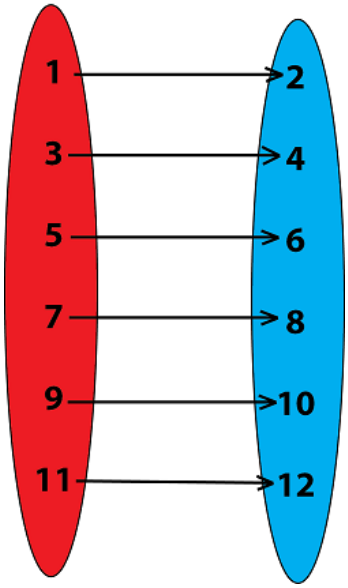
If we map relationship fields is dependent on the type of relationship. One-To-One Relationship refers to Explicit Mapping: the source table includes a foreign key that points to the primary key of the target table. As a consequence, explicit mapping of this relationship field requires altering the column name of the foreign key.

Here the author draw two oval for analysis the input and output of Cell Fin app service of IBB PLC. Cell Fin app is a app based banking system. Through Cell Fin a customer opened account through smart phone and performed banking transaction via data mb or internet server. Via Cell Fin app a customer can performed fund transfer, buy ticket, mobile recharge, receive remittance, pay utility bill by self without going to the bank premises.

Here the author sketch the input and possible output of Cell Fin app and the entity relationship diagram of Cell Fin app.

Inputs: {1, 3, 5, 7, 9, 11}

Outputs: {2, 4, 6, 8, 10, 12}



Here the diagram first red oval shape indicates input and blue oval shape indicate the output products of Islami Bank Bangladesh PLC.

Input of Cell Fin App:

- Fund Transfer
- Mobile top-up
- Buy Ticket
- Bill Payment
- Receive Remittance
- Cards payment

Output of Cell Fin App:

- Receive money from a distance place
- Call and send message through mobile
- Travel
- Active Water, Gas and Electricity connection
- Purchase
- Buy products

Entity Relationship Diagram:

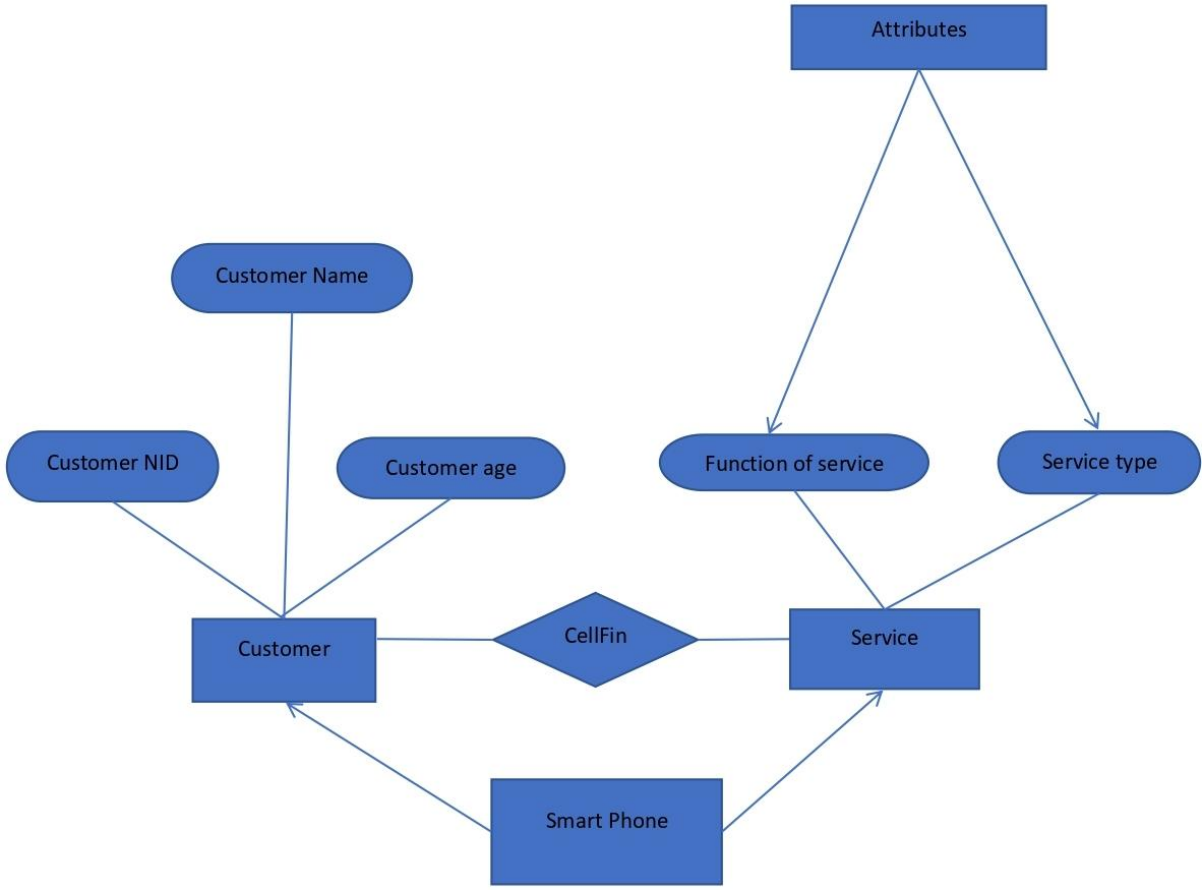
An Entity Relationship Diagram (ER Diagram) symbolically simplify the connection between entities to be stored in a database. Basically, the ER Diagram is a structural outline of the database. Entity Relationship Diagram has various specialized symbols, these symbols used for defining the connection between the data base entities, basically Entity Relationship Diagram perform as a frame work or structure of the entities of data base. ER diagram is designed based on three main parts such as entities, attributes, and relationships.

The following diagram showcases two entities - Bank customer and Cell Fin service, and their relationship. The relationship described between customer and service is many-to-many, as a CellFin service can be opted by several customers, and a customer can opt for more than one services. Customer entity possesses attributes - Cus_Id, Cus_Name &Cus_Age. The service entity has attributes such as Cus_ID &Cus_Name.

Entity Relation -to-Relational Mapping Algorithm:

Step 1: Mapping of Regular Entity Types
Step 2: Mapping of Weak Entity Types
Step 3: Mapping of Binary 1:1 Relation Types
Step 4: Mapping of Binary 1:N Relationship Types.
Step 5: Mapping of Binary M:N Relationship Types.
Step 6: Mapping of Multi-valued attributes.

Entity Relationship of Cell-fin App:



Functional Requirements | System Design | Cell Fin App System:

User Registration:

- Allow customers to create their accounts safely.
- Collect important information for identification and communication.

Payment Processing:

- Support various kinds of payment methods like credit cards, debit cards, digital wallets, and bank transfers.
- Ensure stable and efficient processing of transactions.

Transaction History:

- Maintain a complete document of user transactions.
- Enable customers to access and assessment their transaction history.

User Authentication and Authorization:

- Execute a strong system for user authentication.
- Secure balanced authorization to execute a great number of operations within the system.

Non-Functional Requirements | System Design | Cell-fin App System:

Response Time:

- Define perfect transaction times for a particular operations.
- Ensure swift and efficient device responsiveness.

System Availability:

- Set up the desired level of device uptime
- Execute redundancy and fail over mechanisms to minimize downtime.

Data Encryption Standards:

- Employ industry standards to save sensitive information from any danger.
- Apply best practices for secure information dissemination as well as storage.

Regulatory Compliance:

- Stay informed and notice if any latest relevant product regulation.
- Execute capacities and practices to meet legal requirements.

Use Case Diagram | System Design | Cell Fin app System:

The functionality of a system can be visually displayed by use case diagram. A use case diagram defines the system's functionality through actors, users administrators and their interactions with the system. Use case diagram displays different use cases containing account creation, payment initiation, and also access to the transaction history.

A Use Case Diagram of a Bank Product (Cell Fin):

- To operate the services provided by the bank, a customer must first create an account. For every new customer, Islami bank Bangladesh PLC approves the information and opens a new account. The Cell Fin app system's Add Account capability is Use-Case, and each customer is an actor in the Use-Case Diagram.

- Every customer has the ability to view their account balance and request an account transfer across different Bank offices. A treasurer is a bank employee that assists with customer service.
- Customers can conduct cash transactions in which they must either take cash from their account or add cash value to their bank account. To appropriately complete one or more transactions, one of the two-credit or debit cash-or both may be used.
- Customers may or may not want to obtain details for promote action following each successful transaction. To verify and validate information, the executive might assess the interest value for every account linked to the transaction.
- A customer can receive remittance through their Cell Fin app, but they must include all necessary information in their foreign remittance request.
- The customer must specify the exchange house that best suits their needs and goals, as well as the pull out the remittance amount through any specific branch of Islami bank Bangladesh PLC..
- The management of each bank branch is free to reject remittance requests based on terms and circumstances or to accept and approve the foreign remittance to start the procedure.
- The bank retains records for every customers, and the bank look after every customer in every bank branch.

Capacity Estimation | System Design | Cell Fin App System:

We can assess the system capacity by analyzing specific data like rail gate signal, number of transaction are performing, number of new user joining the platform of Cell Fin etc. By computing whole data we can additionally calculate the required storage capacity for whole year. Here is the simplified calculation given:

According to the figures of Bangladesh Bank, the total sum of app-based transactions in the month of February was TK. 293.86 billion. As such the average daily app-based transaction was TK. 10.49 billion, which was TK. 10.94 billion in January. The total amount of app-based transaction in January was TK. 339.26 billion. This was the highest amount of app-based transactions ever recorded in a single month in the country's history.

Cell Fin the omni-channel banking app introduced by IBB PLC in November 2020, has achieved huge popularity since its launch, says a press release. Around 550000 customers opened accounts in IBB PLC through cell-fin app. IBB PLC Cell Fin app also been playing a vital role in building a cashless society. Presently the app boasts an impressive user base of 2.7 million individual. The tool now boasts 3-4 million users. Around 9.61 lac customers opened account in IBB PLC through Cell Fin app. The number is mounting day by day. Transaction is 29 million per month ,

Transaction per second = 29,000,000/30*24*60*60 = 11.19
Assumption: 26% of the traffic are new user registrations.
47% are using payment process.
TPS = 26+47 = 73
Storage per second (100 KB/transaction) = 73*100 = 7300 KB/S = 7.3 MB/S
Storage required per year = 7.3*60*60*24*365 = 230 TB

Low-Level Design | System Design | Cell FinApp System:

Low-level design comprises specification of several module and their collaboration in System Design of Cell Fin System. Low level design of Cell Fin app incorporate;

Payment Gateway:

In the Low-Level Design (LLD), the Payment Gateway is set up with a fulfilled class hierarchy to expedite the complexities of payment processing. The elevation consists of strategies tailor-made for several modules together with fee initiation, refund handling, and seamless integration with external payment processors. These procedures enfold middle transactional operations, handling authentication, approaching as well as deviation.

Authentication Service:

Within the Low-Level Design, the Authentication Service is set out through a based elevation grading that control user authentication strategies. This class enfold the science of reasons for double checking customers credentials and running authorization test to envision get access permissions. The internal procedures handle the authentication process, validating user credentials regarding saved data, as well as implementing authorization check to decide customers access to ranges.

Transaction Processing Service:

The Transaction Processing Service's elegance formation is consciously manufactured to control technique for processing transactions as well as updating user account balances. This division carry out an essential task in making sure the consistency and integrity of financial records. Internal strategies of Cell Fin app are out lined for efficient transaction validation, processing, and updating of customers account balances.

Database Interaction:

In the Low-Level Design's database co operation section, pattern SQL queries are precisely manufactured for pivotal functions jointly getting back individual statistics and updating transaction stature. These questions are upgraded for execution as well as stick to greatest implementation in database interactions.

High-Level Design | System Design | Cell Fin System:

High-level design largely focus on the general structure of the Cell Fin App System, determining the interactivity among its vital module. High level Design of Cell Fin includes:

System Architecture:

The Cell Fin System comprises crucial cumulative comprising of the User Interface, Payment Gateway, Database, Authentication Service, Notification Service, Transaction Processing Service, Fraud Detection Service, and Logging and Monitoring Service. Communication is secured via HTTPS, as well as association surrounded by module is simplified by means of way of restful APIs. Real-time upgrades are facilitated via Web sockets.

The system is developed for adaptability, using horizontal escalating to ensure uncontrolled accessibility as well as cope with upgraded crowd. Security measures encompass HTTPS for permanent steady data transmission, encoding for sensitive data like credit card statistics, and manifestation for more prudent preventive/safe guard. Accessibility is continued via load balancing for frequenters distribution and redundancy mechanisms for immoderate availability.

Data Flow:

The payment process through Cell Fin app begins alongside a user-initiated pay request transmit from the User Interface to the Payment Gateway. The Payment Gateway confirms the request and onwards it to the Authentication Service, which ratifies customer credentials and execute salient approvals. Authentic transactions move forward to the Transaction Processing Service, inter communicate with the Database to substitute user account balances.

Transaction Logging and Auditing:

In the High-Level Design (HLD), a typical matter is the associate of a robust transaction logging and auditing device. This system secure that each one vitally important pursuit inside the Cell Fin App System are recorded for former evaluation, auditing, as well as trouble shooting. The Logging and Monitoring Service carry out an applicable position in to apprehending and reserving distinctive logs of transactions, user interactions, and system undertakings.

Database Design | System Design | Cell Fin App System:

For Cell Fin App System, the database design will depend on the specific requirements as well as attributes we need to apply. The database design of Cell Fin App System is described below:

1. User Table:

User table store user data. It includes fields like:
user_id: Unique identifier for every user.
Username: User's username for public display.
Mobile_ number: User's specific mobile number for registration.
Password: Securely hashed user password.
Full_name: User's complete name
National_Identity card: User's NID for registration.
User_Device: User's Smart phone.
Created_date: Registration date of the user.

2. Payment Method Table:

Payment method table store information all regarding payment modes. It include fields like:
Payment _method_id: Unique identifier for every payment method id.
User_id: Referential Integrity Constraints linking to the user table.
Payment_type: Type of payment method (Fund transfer, BEFTN, RTGS, Cash withdrawal).
Account_number: Select Account_ number or account detail of user.
Completion_time: Completion _time of the payment method check by user.
Is_default: Flag indicating if this is the user's default transaction method.

3. Transaction Table:

Transactional table store data transaction detail like when he executed payment, trasaction_id, mode of payment etc. It include field like:
Transaction_id: Unique identifier for each transaction.
User_id: Referential Integrity Constraints linking to the User table.
Payment_method_id: Referential Integrity Constraints linking to the payment method table.
Amount: It store the amount of the transaction is executed by user.
Currency: The currency used in the transaction.
Status: The status of the transaction (pending, finished, failed, and many others.).
Timestamp: Date and time of the transaction.

4. Invoice Table:

Transaction table comprise all the invoice/transaction details. It involves fields like:
Invoice_id: It is unique identifier means it uniquely identifies every invoice/transaction.
User_id: Referential Integrity Constraints linking to the User table.
Transaction_id: Referential Integrity Constraints linking to the Transaction table.
Invoice_number: it is unique number associated with every bill.
Due_date: Due date for the invoice/transaction.
Amount_due: The general amount due at the invoice.
Status: The status of the bill/transaction (unpaid, paid, late and many others.).

5. Subscription Table:

Subscription table consist of information of subscription detail of user. It include field like:
Subscription_id: Unique identifier for each subscription.
User_id: Referential Integrity Constraints linking to the User table.
Plan_name : Name of the subscription plan.
Amount: The price of the subscription.
Billing_cycle: The billing cycle of the subscription (month-to-month, every year, and so forth.)
Start_date: Start date of the subscription.
End_date: End date of the subscription.

6. Refund Table:

Refund table include detail of refund transactions. It include fields like:

refund_id : It is unique identifier for every refund.
Transaction_id: Referential Integrity Constraints linking to the Transaction table.
User_id: Referential Integrity Constraints to the User table.
Refund_ amount: It provide data of how much amount is refunded.
Reason: Reason for the refund.
Status: The status of the refund (processed, pending, denied and many others..)

Micro-Services | System Design | Cell Fin App System:

Micro-services formation is an approach to software development wherein a great advantage / feasibility is disintegrated into small, autonomously conveyable services. Each micro service is responsible for specified service functionality and transmitted with different micro services via agreeably represented APIs.

The payment device of Cell Fin app micro services can also incorporate:

- Payment Processing Micro service: Manipulate the foundation of processing payments, collaborating with external payment gateways, as well as carrying on the transaction workflows.
- User Authentication Micro service: Regulates user authentication and authorization, ensure stable get access to the Cell Fin App System. It might perhaps incorporate with identity carriers rather keep up customers credentials securely.
- Account Management Micro service: Deal with consumer bills, profiles, as well as settings. This micro service control obligations for instance user registration, profile updates, and account verification.
- Notification Micro service: Forwards notifications to users about transaction confirmations, account activity, or protection alerts. It assurance that timely transmission is happening with user.

APIs Used in System Design of Cell Fin App System:

APIs are interfaces that permit one-of-a-kind software program units to disseminate with each divergent components. In a Cell Fin app based banking System it also allows several APIs expediates flawless/perfect alliance between micro services, external services, and the user interface. Certain added features of API are as adhere to:

- Payment Gateway API: This API permits deals a number of the payment processing micro-service and external payment gateways. This API is assure payment is processed to appropriate customer.
- User Authentication API: It recognize user authentication micro service to interact with un related added ingredients. It find out user credentials at the time when person login in his device and also authenticate that only authorize person have access to the Cell Fin app system.
- Notification API**:** It simplify transmission among the notification micro service and its unusual module. This API makes sure that clients obtain notifications when they perform any transactions.
- External Services Integration APIs: It authorize alliance with external service which consist of banks, payment networks, and identity verification services. These APIs allow the online transaction system to have correspondence with external entities soundly.
- Internal Communication APIs: It simplify conversation between well defined micro services within the price tool. These APIs confirm that unique element able to link and rate their records internally.

API Code Implementation | System Design | Cell Fin App System:

User Registration API (POST):

- Endpoint: /api/user/register
- Description: It permits users to create their accounts steadfastly.

Request:

```
{
  “username” : “example_user”,
    “mobile number” : “ 01718 XXXXXX” ,
     “password” : “securepassword  123456”
    }
```

Response:

```
{
  “status” : ”success”,
    “message” : “User registration successful”
}
```

Payment Processing API (POST):

- Endpoint: /api/payment/process
- Description: It assist in commence payment processing applying several kind of technique.

Request:

```
{
   “user_id” : “01718 XXXXXX” ,
   “amount “ : “100.00”,
   “payment_method” : “bank_ transfer”,
   “account_ number” : “****  ****  **** 13548” ,
   “transaction_time” : “ AM/PM”
 }
```

Response:

```
{
  “status” : “success”,
```

"message " : "Payment processed successfully"
}

Transaction History API (GET):

- Endpoint: /api/transaction/history?user_id=01718 XXXXXX,
- Description: It support in getting back transaction history of user.

Request:
GET /api/ transaction/history? user_id = Retrieveing
Host : your-payment-system-api.com
Accept : application/json

Response:

{ "transaction" : [
{ " transaction_id" : "34250XXXXXXXXXX" ,
" amount" : 150.00,
"status" : "finished" ,
" timestamp" : "26/01/2025 05:27 PM " },]
}

Transaction Processing API (PUT):

- Endpoint: /api/transaction/update
- Description: Updates transaction status (e.g., pending to finished).

Requests:

{
"transaction_id": "34250XXXXXXXXXX "
"new_status" :"finished"
}

Response:

{
"status" : "success",
"message": "Transaction status updated"
}

Scalability | System Design | Cell Fin App System:

Scalability is significant for operating numerous users and transaction volumes. Scalability comprises:

Horizontal Scaling:

Horizontal scaling incorporate together with more servers or times to disseminate the workload competently. In Cell Fin App System, this denotes multiplying the number of servers to deal with a large span of parallel customers and transactions. Through horizontally scaling, the device can maintain consciousness all over high point mean time beyond meeting benchmark general achievement blockage.

Load Balancing:

Carrying out load balancing mechanisms is vital for several incoming requests gradually during more than one servers. This assurance that no single server is surcharge with traffic, upgrading functional convenience utilization as well as hindering a single point of collapse Load balancing is a pivotal approach for improving device solidity and awareness.

Containerization:

Along with Docker, containerization technologies providing scalability with the functional initiative of enveloping utility module into wrapping storage. This storage provide suitability all over entire domain, facilitating utilization as well as allowing well organized scaling. With storing the Cell Fin app System proceeds flexibility and the capability to scale particular progressive separately.

Micro services Architecture:

Micro services create an assistance significantly to scalability by means of authorizing isolated units to scale separately. Individually micro service conduct a definite promotional venture potentiality, and as request advance for that particular trait, the relating micro service can be scaled solely beyond influencing the entire system. This segmented enhance resilient as well as consciousness towards Cell Fin app.

Database Sharding:

Database sharding incorporates horizontally partitioning information covering a few database servers. This strategy is in specific appropriate for controlling substantial datasets in app based banking system. Through circulate the data covering more than one servers, the system can fruitfully regulate and recover information, rendering to moved ahead regular execution and scalability.

In conclusion, an ingenious Cell Fin App System able to attain monetary prospect of the banking sector. By applying modular architecture, overseeing structured database design, and delivering direct transmission via APIs able cause understructure for efficient digital banking ecosystem. It required to negotiated here that we can System Design for Cell Fin App System through taking into account all the explained factors in the chapter.

Feasibility Analysis:

A feasibility analysis assists us evaluate the costs and activities required to set up and run a business, and how to make an informed decision about whether to start a business and how to do it.

Steps to Conduct a Feasibility Study:

- Run a preliminary analysis. Creating a feasibility study is a time-intensive process.

- Evaluate financial feasibility.
- Run a market assessment.
- Consider technical and operational feasibility.
- Review project points of vulnerability.
- Propose a decision.

The four major elements to be included in a financial feasibility analysis include the following: the initial capital requirements, estimated earnings, time out of cash, and resulting return on investment.

Conducting a Feasibility Test:

- Step One: Conduct a preliminary analysis.
- Step Two: Prepare a projected income statement.
- Step Three: Conduct a market survey.
- Step Four: Plan business organization and operations.
- Step Five: Prepare an opening day balance sheet.
- Step Six: Review and analyze all data.

There are five key factors of a feasibility analysis comprise economic, marketing, technical, financial and management feasibility. Each type of test take account of discrete angle of the project, so it's vital to take into account all five when determining which way to take progressing ahead.

For instance, technical criteria can incorporate the availability of skills, equipment, and materials, while economic criteria may comprise the cost, revenue, and profitability of our plan. By adding up the scores for each perspective, we can get a total feasibility score for our data.

All four parts of the feasibility analysis (productive/service, industry/market, organizational and financial) are precise and necessary, besides what is overlooked is a portion that allowing awareness to the longer-term precondition for achievement and sustainability.

The Seven Feasibility Study Steps of a Business:

- Preliminary analysis.
- Defining the scope.
- Market research.
- Financial assessment.
- Roadblocks and alternative solutions.
- Reassessment.
- Go or no-go decision.

A feasibility analysis is a test/study that inspect a recommended solution and assess whether it is possible, given certain restriction. It comprise six segments: introduction, background information, requirements, evaluation, conclusions, and finally the recommendation or final opinion section.

As the name implies, a feasibility analysis is used to find out the viability of a plan, such as ensuring a project is legally and technically feasible as well as economically justifiable. It shows us whether a project is worth the investment-in some cases, a project may not be achievable.

Feasibility Analysis:

For feasibility analysis the author incorporate an introduction to the project its indicate the purpose of Cell Fin app , problems of Cell Fin app , desired solutions and an overview of the sources the author used to support the credibility and legality of the paper.

Market Feasibility:

The knowledgeable and penetrative information about the Cell Fin app system is provided by the market feasibility section. This section also find out the market research and future outlook for the product of Cell Fin app service of Islami Bank Bangladesh PLC. At first the author outlining the bank company's industry in Bangladesh. The author analysis its history, current practices and trends along with future projections for the bank industry as a whole. Then the author can commence limiting her focus to explore how Cell Fin app of IBB PLC fits within bank industry. The author then list top competitors of this bank such as Social Islami Bank, Al Arafah Islami Bank, Dutch Bangla Bank, Standard Chartered Bank, their primary source of revenue, sales figures and potential niche areas the banks could run after to amplify their customer base. The market feasibility portion assists the author obtain more of an interpretation of the banking industry, what it has to offer and how the feasibility project of Cell Fin app could advantages the development of banking industry.

Technical Feasibility:

The prosperity of a banking product usually controlled by the technical feasibility portion. This section define specific functional point of a banking product Technical feasibility part analyze location of the bank company, materials needed to create the product or service the bank offer, the manufacturing process, quality assurance facilities and necessary transportation to ship their products to retail locations. The technical feasibility portion provides detailed interpretation of which factors carry on bank business so the bank management can keep up conveying top-tier products and services to their customer base. Furthermore this section aids and validate the reliability of the financial feasibility part. In this research the author found that Smart Phone, Data MB, Internet flexibility are the main factors of technical feasibility of Cell Fin app of IBB PLC.

Financial Feasibility:

All aspects of the finance of a product is trace by the financial feasibility section. In this portion the author should insert information about bank's investors, current revenue, assets and liabilities as well as total revenue from the previous years. The author also add a cost benefit evaluation that aids and uphold bank business needs. The financial feasibility division focus to assure the share holders to either invest their assist, funds or both into the recommended project by expressing them the amount required to keep up their business operations.

Organizational Feasibility:

The organizational feasibility portion illustrates company's legal and ethical practices to the stake holders. This part contains a sketch out of the extensive formation of the bank company such as branch location or departments. Here the author draws the overall structure of Cell Fin app service.

The management of Islami Bank Bangladesh PLC might ought to contain a small bio for each of their founder, share holder and board members. Any customers can also advantage from highlighting the HR procedures that the bank uses to retain ethical and legal responsibility with regards to employees, also encouraging procedures the bank management accustomed to induce productivity in the workplace. The organizational feasibility portion assists the customers find out whether Islami Bank Bangladesh PLC's current application acclaim or uphold the recommended projects Cell Fin app.

Discussion & Analysis:

- In this research the author identified the problem of manual account opening process of IBB PLC. Again the author also found the requirement of Cell Fin app, feasibility analysis, analysis on modeling and scope analysis of Cell Fin app.
- The author found that algorithms of Cell Fin app can analyze transactions to identify what is genuine and what is potentially fraudulent.
- The author also showed that the algorithms of Cell Fin app can automate repetitive tasks, such as data entry, which can increase efficiency and reduce human error. The author also identify the possible input and output of Cell Fin app of IBB PLC,
- The author also showed that algorithms of Cell Fin app can forecast future trends and outcomes based on historical data and current variables.
- The author found that the algorithms can help IBB PLC outperform the competition by increasing innovation, reducing risks, and more.
- The author also showed that algorithms can help bank analyze large amounts of data quickly and accurately. For example, IBB PLC can use predictive algorithms to forecast customers transaction patterns.
- In this research the author also used Entity relationship diagram of Cell Fin app of IBB PLC. This diagram showed the possible input and out of Cell Fin App. Here the author also discuss the System Analysis Design of the Cell Fin app of IBB PLC.
- The author also discuss the feasibility analysis of IBB PLC. The author found that for market feasibility analysis the bank management of IBB PLC must analysis the top competitor of this bank and their modern banking app.
- For technical feasibility analysis the author found that smart phone, data MB, internet flexibility, server etc are the main technical feasibility factor of Cell Fin app of IBB PLC.
- Here the author showed that for financial feasibility analysis of Cell Fin app the current revenue, assets and likability of IBB PLC are most influential factors. Here the author also discuss the cost benefit analysis of Cell Fin app.
- For organizational feasibility analysis the author advised that the management of IBB PLC must consider the overall structure of Cell Fin app and find outs its benefits and limitation.

Conclusion:

System analysis and design can assists businesses understand complex structures and the needs and requirements of a new product/service. Organization use System analysis design to accept change management. System Analysis Design (SAD) can help businesses improve product development and decision-making by providing graphical representation to a single database for managing transactions and planning. In this research the author used systems analysis design can help the bankers to see the pictorial presentation of the function of Cell Fin app as a whole. The structured analysis and design takes the client's needs into account from the beginning of Cell Fin app. System analysis can help ensure that software solutions are designed to facilitate the installation and function of Cell Fin app.

Here the author used algorithms to translate raw data into objective decisions, which can help bank customers make smarter decisions. The algorithm of IBB PLC showed that opening account through Cell Fin app is very feasible but it has some prerequisite such as opening account through Cell Fin app one must need valid National Identity Card and Smart Phone. Algorithms of Cell Fin app can provide personalized recommendations based on individual preferences and behavior.

So it is concluded that in this paper the author clearly explain the benefits, precondition, feasibility analysis of the new product Cell Fin app of IBB PLC.

Implication & Future Study:

Discuss the whole research paper the author has suggested some implication of the paper:

- For companies: The author hope that this paper found a bonding between technology and banking. This relationship conduct benefits for banks, customers and other service oriented organizations.
- For the Academic field: Any new researcher or student who want to conduct a research about System Analysis Design of a product/service this paper is mostly suited for him/her.
- For future studies: The future researcher should conduct research about the role of System Analysis Design on various product/service.

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