Software Architecture
Derivation and Evaluation of Business Blueprints

You need to create and evaluate a business blueprint for your course project and submit the following:

Part 1: Prioritize Stakeholder Qualities/Constraints and Associate them with Quality Categories

Create a table that enumerates and prioritizes each of the stakeholder needs and classifies them based on architectural quality categories, such as reusability, maintainability, performance, cost, reliability, etc. Note that priorities are often not stated explicitly, requiring you to infer priorities. Similarly, you may only have priorities in the context of one stakeholder, requiring you to merge priorities across stakeholders.

- *Deliverables:*
    - Table (Word or Excel) with stakeholder need, priority, classification, and brief justification for priority assignment.

Stakeholder need	Priority	Classification
Application can be used multiple times	1	Reusability
Each step of data must be recorded	2	Reliability
User can do what they would like to do directly	3	Convenience
The interface is concise and intuitive which attracting users' attention	4	Design
Maintainability	5	Process
Suitable for most current mobile phone models	6	Performance
The budget of the project is almost none	7	Cost

Part 2: Derive a Business Blueprint (BB)

Create a BB based on stakeholder needs and assigned qualities and priorities from Part 1. As discussed in class, business blueprint derivation involves collecting domain functions and data into logical components that are "responsible" for those functional requirements.

- *Deliverables:*
    - Representation (components and connectors)
        - Text (Word or Excel):
            - List of components.
            - List of functions allocated to each component.

    - Note: A function can only be allocated to one component (i.e., cannot be replicated across components).
- List of data allocated to each component.
    - Note: *You need not allocate events (or "transient" data elements).* For example, assume event "UserHasBeenAuthenticated" is generated by the "Authenticate" function and required by the "Add Course" function. The event is clearly passed from "Authenticate" to "Add Course" (creating a dependency between them), but it does not need to be allocated to a component.
    - Note: A data element can only be allocated to one component (i.e., cannot be replicated across components).

Components	Functions and Data
User	Functions: i. Create a new user account ii. Login through the third-party account iii. Setup phone permissions iv. Upload and download data v. Request access to the tool Data: i. The indexes from database ii. The records iii. Others' labels iv. User weight v. Personal information
Database	Functions: i. Change information in real time ii. Export special information iii. Change formulation information by manager iv. Allow to upload and download labels v. Create document list Data: i. Database list ii. Labels from users iii. Status report iv. Final database file v. Upload and download form

Management	Functions: i. Allow user to login ii. Allow to create user iii. Allow to delete user iv. Allow to create new projects v. Allow to cancel projects vi. Allow to close projects vii. Create project list Data: i. Project list ii. Users list

- List of function I/O dependencies between components resulting from the following:
    - *Function-to-function data I/O:* Function1 is allocated to Component1, Function2 is allocated to Component2, and Function1 generates Data1 that is required by Function2.
    - *Function-to-function event I/O:* Function1 is allocated to Component1, Function2 is allocated to Component2, and Function1 generates Event1 that is required by Function2.
    - *Function-references-data-stored:* Function1 allocated to Component1 uses input Data3 retrieved directly from Component3, where it was allocated, or Function1 allocated to Component1 outputs Data3 that is stored in Component3, where it was allocated.
        - Note: If a data element has been allocated to a component, if must be referenced directly by *some* function in the business blueprint.
- List of function I/O dependencies between components and external producers/consumers resulting from the following:
    - *External-to-function data I/O:* Function1 is allocated to Component1 and requires DataX1 as input from an external producer.
    - *External-to-function event I/O:* Function1 is allocated to Component1 and requires EventX1 as input from an external producer.
    - *Function-to-external data I/O:* Function1 is allocated to Component1 and outputs DataX2 to an external consumer.
    - *Function-to-external event I/O:* Function1 is allocated to Component1 and outputs EventX2 to an external consumer.

Components	Functions and Data

From: Database To: User	从数据库中提取需要标注的信息，一一发送给用户（每个信息的标注上限需要设定） Extract information that needs to be annotated from the database and send it to the users one by one (the upper limit of each information needs to be set)
From: Management TO: User	管理人员可以向用户发送指定的 part，例如特定的商业广告、与热点用户相关的需要紧急标注的信息等 The manager can send the specified part to the user, such as specific commercials, information related to hotspot users, etc. that need urgent annotation.
From: User To: Database	对需要标注的信息进行反馈，返回一个 label 数据到数据库中 Feedback on the information you need to annotate, return a label data to the database
From: Database To: Management	管理人员可以从数据库中提取指定的信息 Managers can extract specified information from the database
From: Management To: Database	管理人员可以向数据库中发送指定内容，可以通过数据库向用户发送进行标注 Managers can send specified content to the database, which can be sent to the user for annotation

- List of function I/O satisfied within the same component:
  - *Function-to-function data I/O:* Both Function2 and Function4 are allocated to Component2, and Function2 generates Data4 that is required by Function4.
  - *Function-to-function event I/O:* Both Function2 and Function4 are allocated to Component2, and Function2 generates Event4 that is required by Function4.
  - *Function-references-data-stored:* Function4 allocated to Component2 inputs or outputs Data5, which is also allocated to Component2.

- Derivation Plan and Rationale
  - Create a derivation plan composed of at least *5 relevant heuristics from the heuristic guidelines* that accompany this assignment. (At least one of those heuristics must be related to coupling/cohesion or size/complexity in order to complete Part 3.)
    - Associate heuristics with your blueprint goals.
    - Describe how the heuristics map to stakeholder quality needs.
      - Blueprint goals should help your mapping effort.
      - I recognize that some of your stakeholder needs cannot be addressed at the business blueprint level. Nonetheless, *discuss all stakeholder needs and be explicit about those that cannot be addressed*.
    - Prioritize the goals and heuristics according to the priorities identified in Part 1 and your judgment of heuristic effectiveness (e.g., heuristic 1 is more effective than heuristic 2 for promoting reusability because…). Justify your priority assignments.
    - Identify potential conflicts and describe tradeoff options based on priorities and heuristic effectiveness.

1	**Goal: Reusability**	**Description**
1.1	Group based on implementation framework	这个系统在这个 project 中目的是为了数据标注，针对图片进行，从服务器提出需求之后得到用户的反馈，这种模式对云天励飞这样的公司是非常重要的获取大数据的途径。
1.2	Try to change this model to another	这种系统应该是稳定的，除了对图片数据的标注，应该有其他数据的标注，在今后的发展中一定会对此项目再次利用。
2	**Goal: Design**	**Description**
2.1	Improve the user vision	软件首先要做到足够吸引用户，才能有传播的市场。
2.2	Simply the users' work	简化用户操作过程，我们会提供直观的界面，有利于用户对软件的偏爱。
3	**Goal: Cost**	**Description**
3.1	Group based on implementation reality	Instead of creating new toolkit, the components and respective functions can be done by existing technologies in the market, which will reduce the personnel needed to develop the application also reduce the time to implement
3.2	Reduce class complexity-size	It will reduce the complexity of the design in the component, which could be done by more simple components. It will reduce the time and cost of development.

Part 3: Evaluate Business Blueprint Structure

Calculate the following structural metrics for the Business Blueprint from Part 2.

- *Deliverables:*
    - Coupling and Cohesion Metrics
        - Number of Inputs/Outputs between components
            - For each component:
                - Number of inputs across all functions in the component (data and events) that are received from another component + Number of outputs across all functions in the component (data and events) that are sent to another component.
        - Number of dependencies between components
            - For each component:
                - Number of components to which this component sends some output or from which this component receives some input.
        - Degree of Cohesion
            - For each component
                - Percentage of functions in the component that receive all inputs from functions/data within the component and send all outputs to functions/data within the component.
    - Size and Complexity Metrics
        - Number of functions in a component
            - For each component
                - Number of functions allocated to that component.
        - Number of data elements in a component
            - For each component
                - Number of data elements allocated to that component.
        - Number of components in the blueprint
            - For the blueprint as a whole
                - Number of components.
        - Component complexity
            - For each component
                - Number of data elements + number of functions + number of inputs and outputs for each function.

- Support for Applied Heuristic

  For at least one of the heuristics you chose when deriving your Business Blueprint, discuss how the metrics above can be used to demonstrate that the heuristic has been applied.

Number of inputs/outputs between BB components(NIOBC):
NIOBC(User) = 10
NIOBC(Database) = 10
NIOBC(Management) = 9

Number of dependencies between BB Components(NDBC):
NDBC(User) = 3
NDBC(Database) = 1
NDBC(Management) = 1

Degree of Cohesion(DC):
DC(User) = 0
DC(Database) = 1/6
DC(Management) = 0

Number of functions in a component:
User = 10
Database = 10
Management = 9

Number of data elements in a component:
User = 3
Database = 4
Management = 2

Number of components in the blueprint:
User = ?
Database = ?
Management = ? (**Not Sure**)