# **How to think about your project?**

1. Identify the problem that you are interested in and want to solve it. Below is the list of problem by category:

**APPLICATION PROJECT**

In the application project, you will USE existing data structure library or your own library in the chosen problems categorized below.

CATEGORY 1 Business Problems:

* Reservation systems: Students Enrolment, Prescription Tracking, Hotel Booking, Ticket Reservation, Library Management systems, Hospital Management Systems, Travelling agency, Banking Management System, etc.
* Billing systems: Restaurant billing systems, Supermarket billing system
* Directory systems: Telephone Directory, Contact Book, etc
* Store systems: Game Store, Apparel Store, etc
* Gaming application: Maze, N-Queen, Othello, etc
* Calendar systems
* Etc.

CATEGORY 2 Computing Problems:

* Scheduling: Train schedule, Bus schedule, Lecturing schedule, University schedule, etc
* Routing: Shipping systems, Flight path, Cheapest commuting, etc
* Resource Allocation: Traffic light implementation
* Etc.

CATEGORY 3 Combinatorial Problems:

* Bin packing
* Knapsack
* Travelling Salesman
* Map coloring
* Chinese Postman
* Minimum Spanning Tree
* Shortest Path
* Perfect Matching
* Etc.

**IMPLEMENTATION PROJECT**

In the implementation project, you will CREATE a data structure library of the chosen data structures:

* + Vector
  + List
  + Map
  + Tree
  + Graph
  + Or combination of more than one data structures
  + Etc,

1. If you choose the Application Project, identify the suitable data structures that will make up your solution. Ask these questions to yourself:

* What are the (user) Requirements?
* What are the Scenarios of usage?
  + Operation (insertion, deletion, etc)?
  + Frequency of access
* Is there any Constraints (memory, space, speed)?
* How much is the Amount of data?
* How is the Arrangement of data (ordered, unordered)?

Here is the way of thinking for application project:

CONFRONT the requirements, scenario of usage, constraints, and the amount and nature of data input WITH each data structure characteristics to **decide on the “IDEAL CHOICE of data structure” for your problem**.

If you choose the Implementation Project, identify what uniqueness of your data structures library that differentiates it from the existing ones. Ask these questions to yourself:

* What unique capabilities of your data structure library?
* How will you store the actual data?
  + Do you want to use the underlying storage in arrays or dynamic memory?
* How do you design the access to your data structure library?
  + Do you want to provide the user of your library more freedom or more restriction?

Here is the way of thinking for data structure library implementation project:

Each data structure is unique in their own ways. Each data structure is distinct type, having **different capabilities** and **store their data in separate ways**. Different kinds of data structures are **suited to different kinds of applications, and some are highly specialized to specific tasks**. A data structure is **designed to restrict or free how elements are inserted, retrieved, and removed**, which will **behave like a certain Big-Οh function**. PROVIDE CONVENIENCE of use and ASSURANCE of the correctness for the designated data structures in your Data Structure LIBRARY.

Keep in mind that Programmers always want to create algorithms that works efficiently with the chosen data structure with respect to:

* 1. Retrieval
  2. Traversal
  3. Insertion
  4. Deletion
  5. Searching
  6. Sorting

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