Software Engineering Notes
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REFERENCES

- Introduction to Software Engineering course at the University of Toronto

PRODUCT MANAGEMENT

- About solving customer's problems by deciding on what development team should build.
- A successful software project needs a balance of tech, UX, and business (domain).
- ***Users***: people who use the product you build.
- ***Customers***: people who pay for the product you build.

Determining What Software to Build

1. Define high-level product goals. Answer who, what, why focusing on problem and users not product.
2. Understand what users need using personas, e.g., user stories: As <role>, I want <action/desire>, so that <benefit>.
    a. ***Acceptance Criteria***: conditions a product must satisfy to be accepted by user in story.
3. Product design: build a minimal prototype, UI, how it works, check with stakeholders (users, customers).

Lean Project Management

- Build a prototype that is minimal, MVP (minimum viable product)
- [TODO] Lean startup: https://theleanstartup.com/principles

DATA MODELLING

Data Modelling

- ***Conceptual Data Model*** (CDM): a business-level artifact that defines persistent entities, attributes of entities, relationships between entities.
- ***Logical Data Model*** (LDM): platform independent, normalized (no duplicates) data model made up of tables of 1-1 mappings between CDM entities and LDM tables.
- Database normalization:
    - ***1NF***: each attribute have atomic data and each table has a PK (unique id).
    - ***2NF***: every non-key attribute (column) must depend on all columns of the PK.
    - ***3NF***: attributes determined only by PK.
    - Reference: https://youtu.be/upS2HlUj1gI?t=137
    - TODO: https://learn.microsoft.com/en-us/office/troubleshoot/access/database-normalization-description

Serialization and Persistence

- ***Serialize***: convert in-memory objects into data to be written or streamed as a string or bytes array, (e.g., Python pickle, JSON, XML).
- ***Desterilize***: convert serialize data back into in-memory objects.

Types of NoSQL DBs

- Document, key-value, wide-column, graph.
- TODO:
  https://learn.microsoft.com/en-us/dotnet/architecture/cloud-native/relational-vs-nosql-data
  https://www.mongodb.com/resources/basics/databases/types

Managing Data

- ***Data Access Object*** (DAO): design pattern(??) that abstracts details of underlying data store.
    - TODO: https://www.oracle.com/java/technologies/dataaccessobject.html
    - https://sourcemaking.com/design_patterns/decorator

- ***Object Relational Management*** (ORM): data manipulated in object graph and stored in tables.