Design

How to build a software application?

- Establish your “why” (Project Charter) with your sponsor
- Build a team
- Define & Manage Scope and Requirements
- Plan & Manage the work (tasks, features, assignments, measuring and reporting)

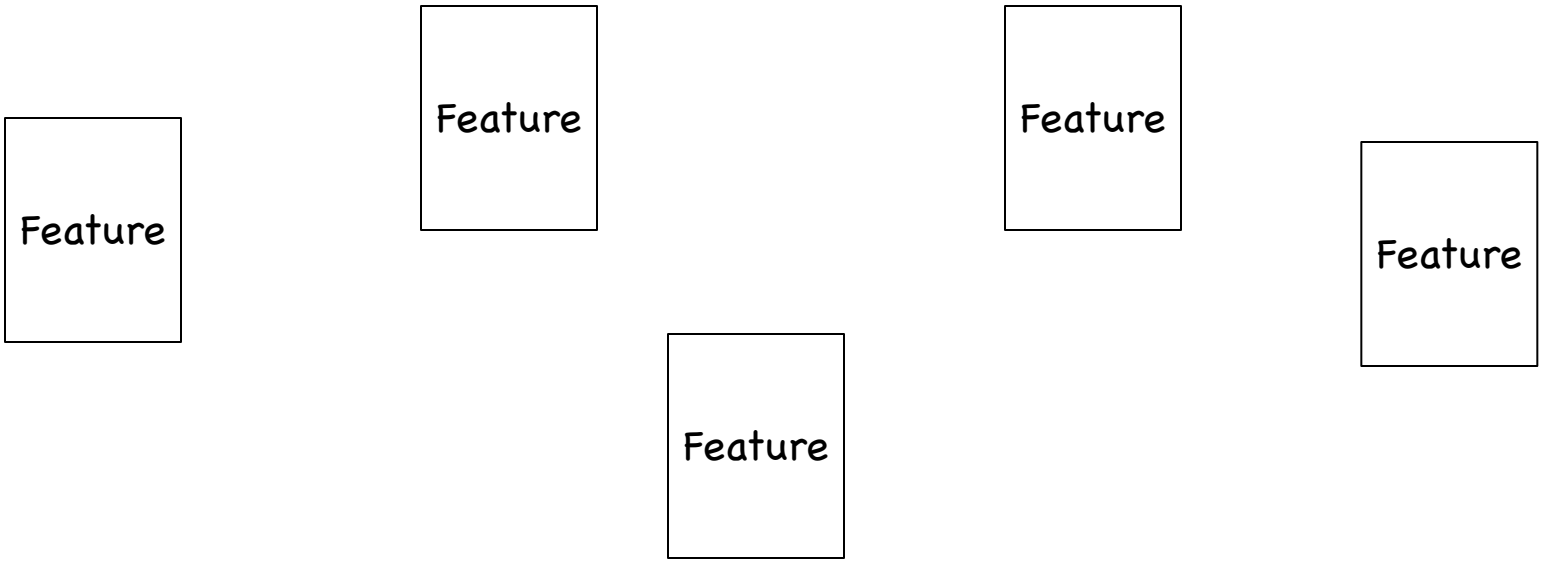
Before you BUILD, you must DESIGN

Software Design

- Driven by Requirements
- Start with Architecture Design
  - Operating environment
  - Software stack
- Module Design
  - Features, Functions ➔ Modules
  - Problem solving: divide & conquer
  - Each Module should stand on its own

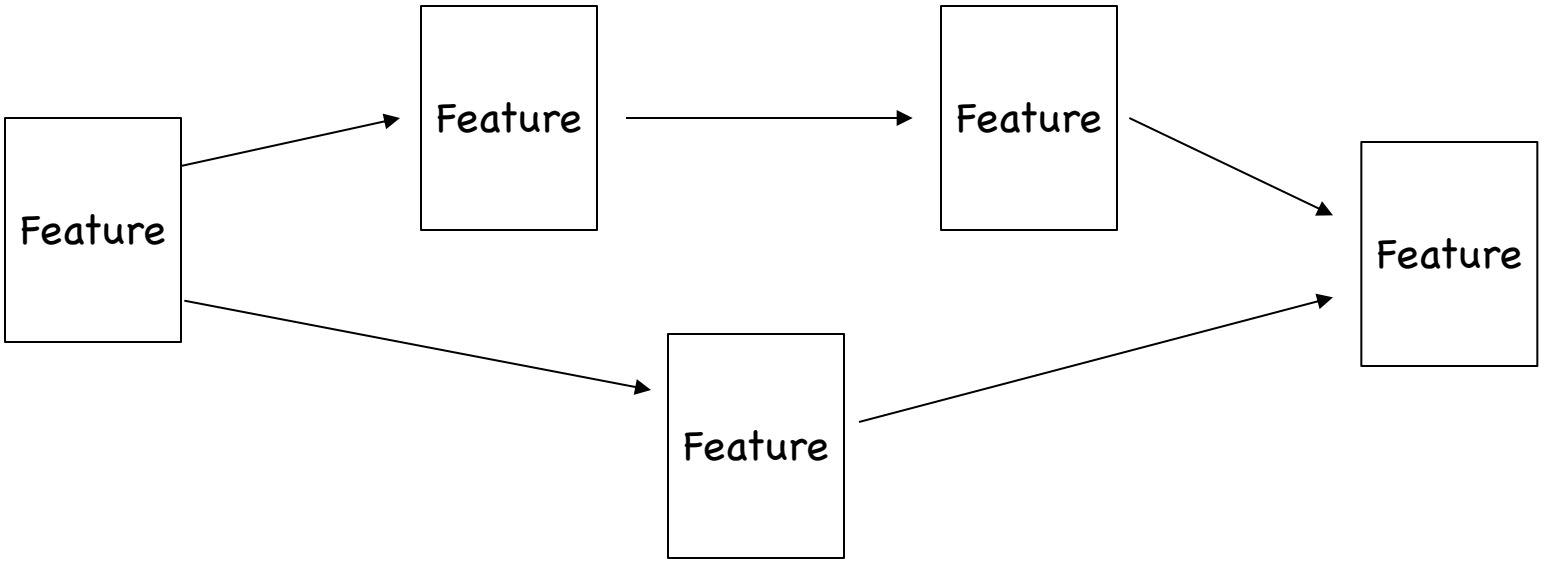
Defining Modules:

A simple chart or diagram depicting each module



Project Planning

- In what order are we going to work on each feature?
- Who, when, dependencies?



Our Goal in Design:

To transform the requirements specification for a feature or function into working code.

A simple tool:

The Data Flow Diagram (“DFD”)

For each module or feature:

- Data flows in, from where
- Process the data
- Data flows out, to where
- Data is stored

A simple tool: The Data Flow Diagram

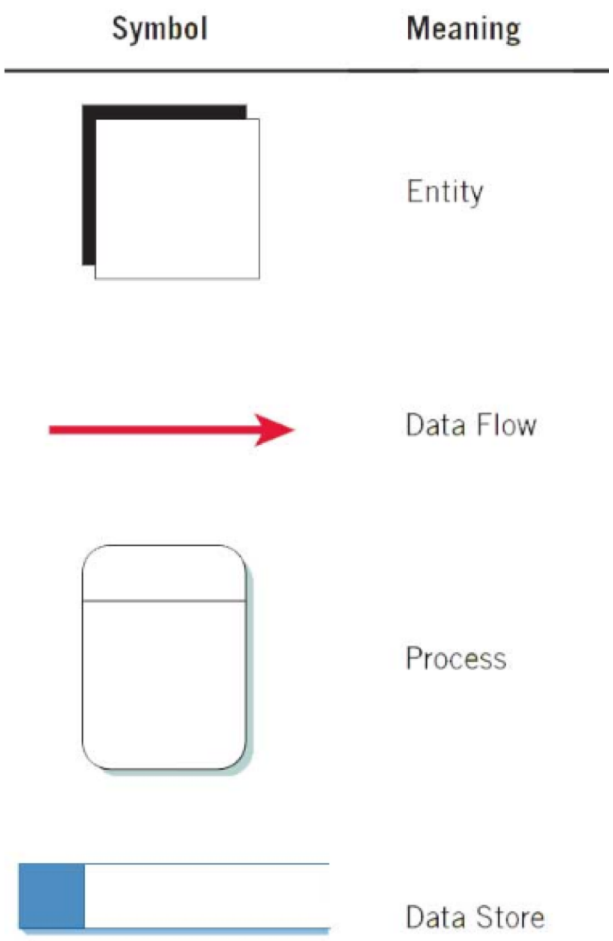
Four objects:

External Entity -

Data Flow -

Process -

Data Store -



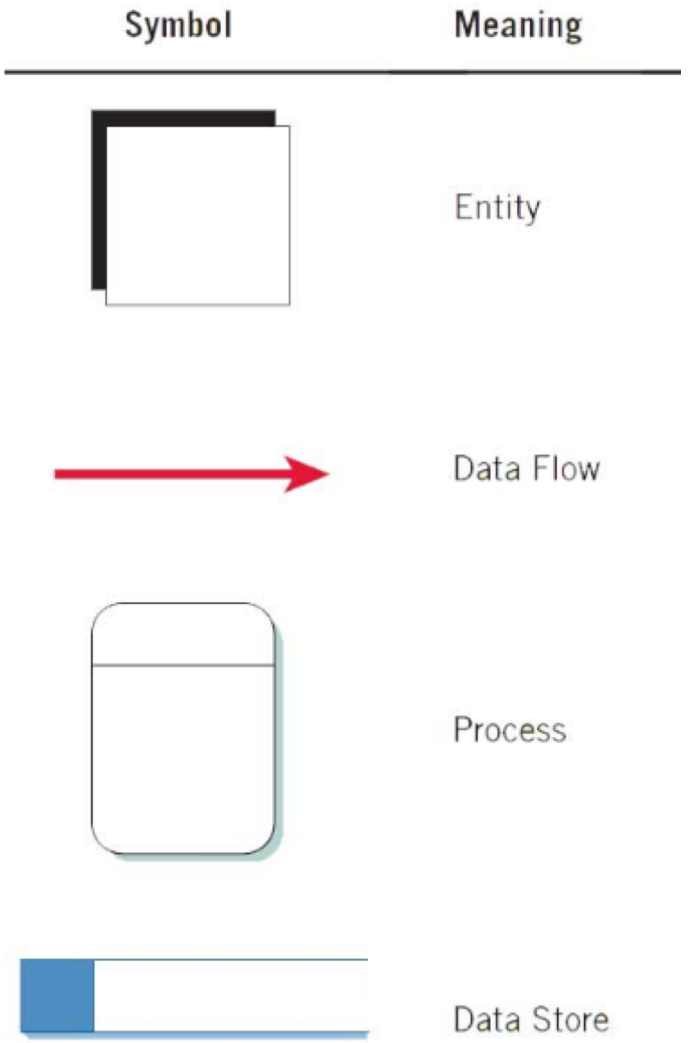
Design

External Entity – Where does the data come from or end up?

Data Flow - Where does the data go ?

Process - How do we process (modify) the data?

Data Store – Where to we keep the data between processes?



(Using Gane-Sarson notation)

Design

- **External entity:** an outside system that sends or receives data, communicating with the system being diagrammed. They are the sources and destinations of information entering or leaving the system. They might be an outside organization or person, a computer system or a business system. They are also known as terminators, sources and sinks or actors. They are typically drawn on the edges of the diagram.
- **Process:** any process that changes the data, producing an output. It might perform computations, or sort data based on logic, or direct the data flow based on business rules. A short label is used to describe the process, such as “Submit payment.”
- **Data store:** files or repositories that hold information for later use, such as a database table or a membership form. Each data store receives a simple label, such as “Orders.”
- **Data flow:** the route that data takes between the external entities, processes and data stores. It portrays the interface between the other components and is shown with arrows, typically labeled with a short data name, like “Billing details.”

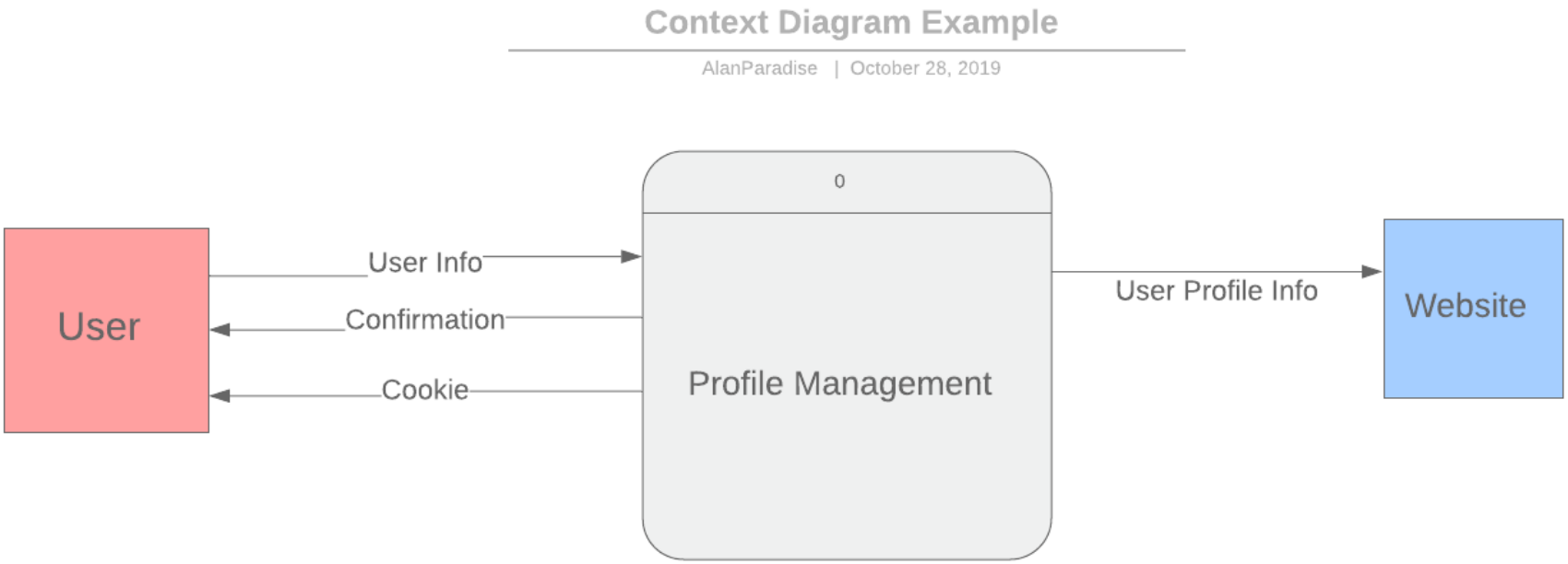
DFD Example

Feature: Managing User Profiles for a Web Site

- Your organization has a website
- People can log on to the website and purchase stuff
- First time in, users must register (create a profile)
- Subsequently, users must log in with ID & PW
- Once they're in, a cookie is stored to keep track of them

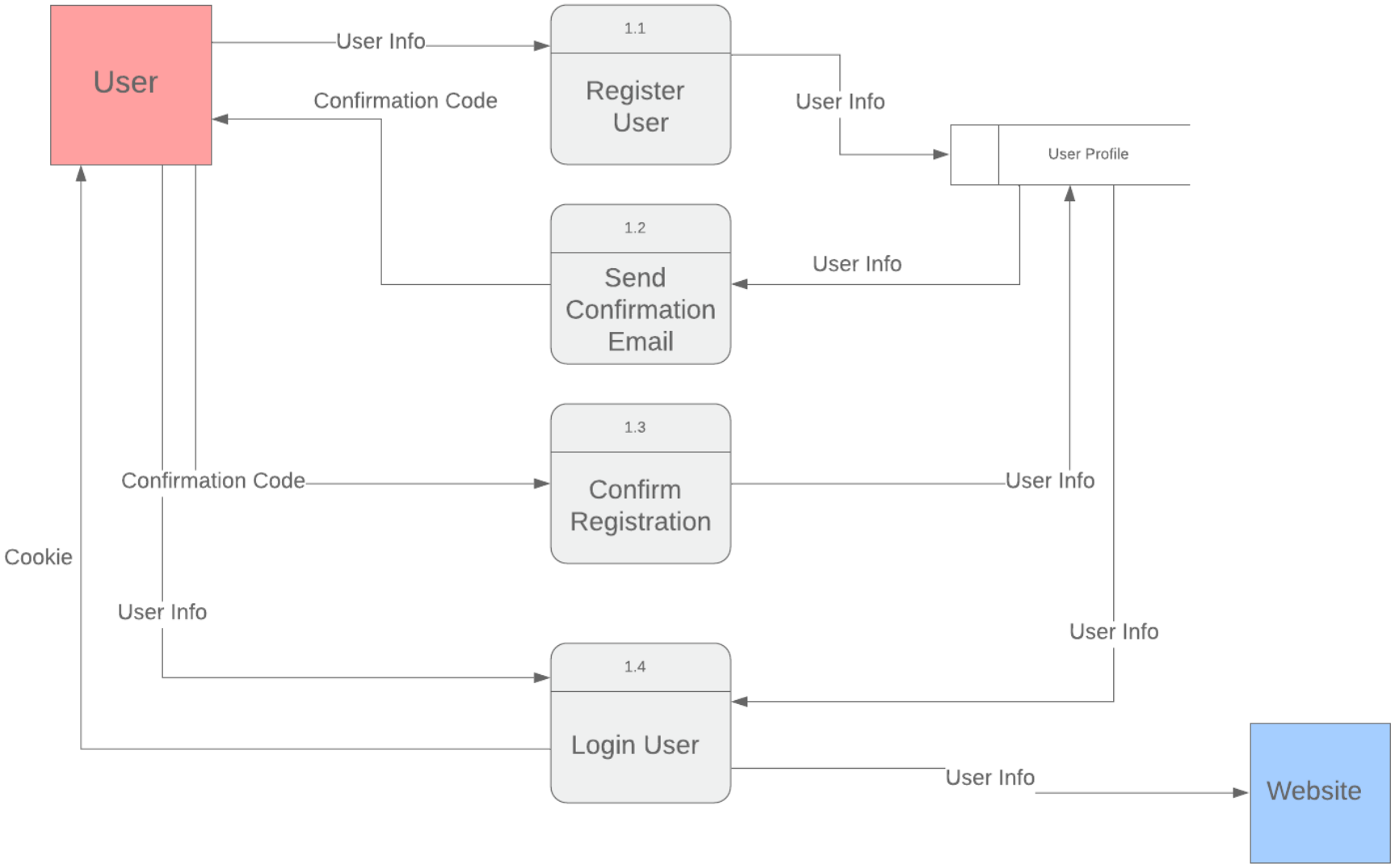
DFD Example

Level Zero Diagram:



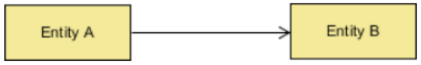
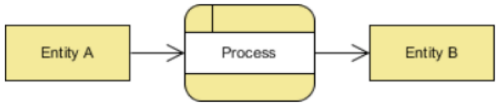
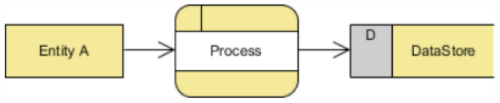
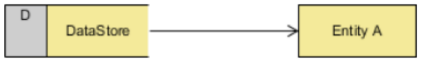
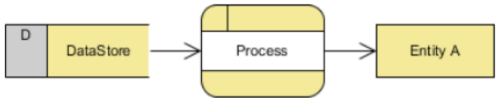
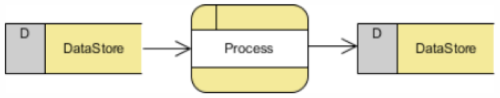
Level One

AlanParadise | October 29, 2019



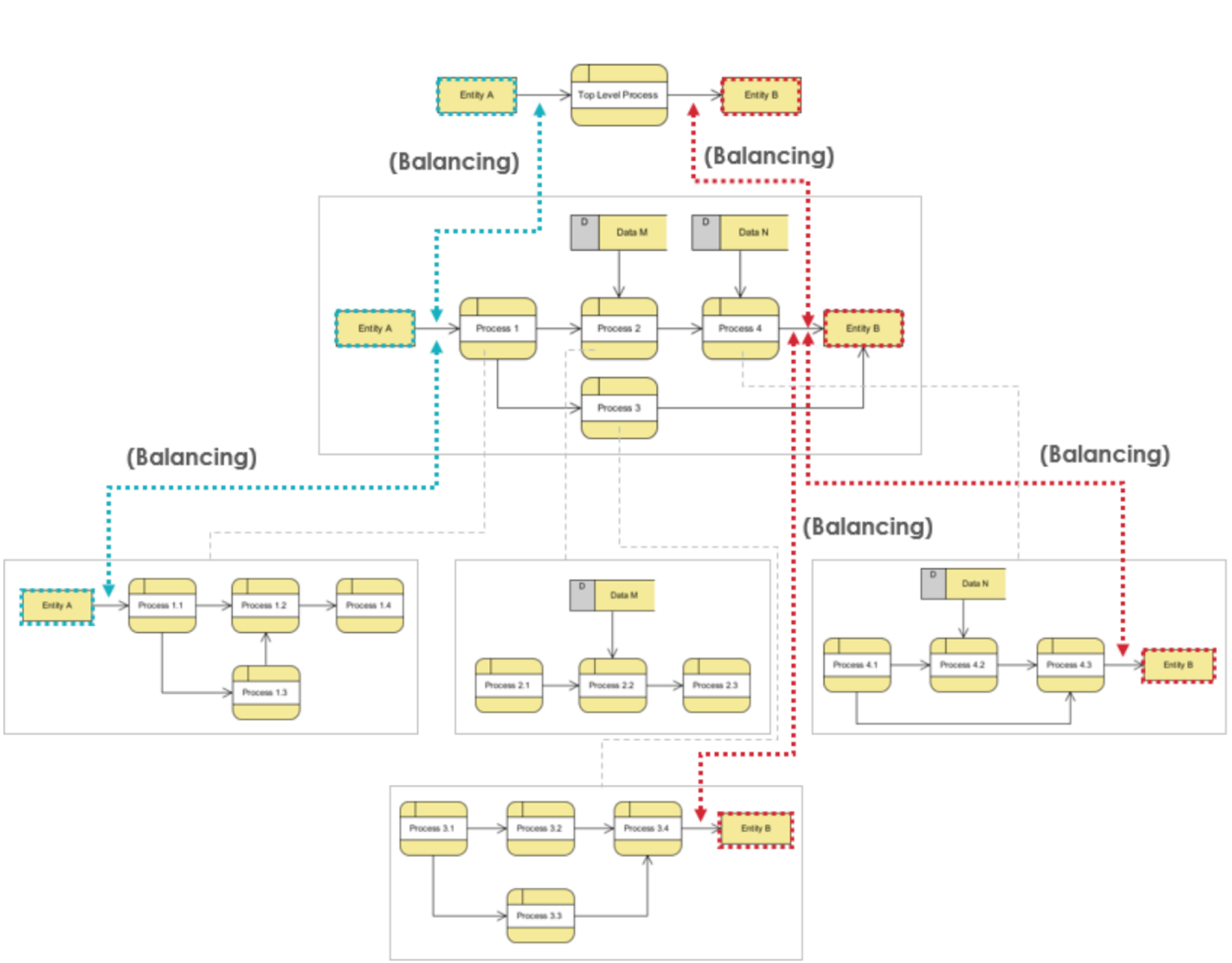
Rules

- Each process should have at least one input and at least one output.
- Each data store should have at least one data flow in and one data flow out.
- Data stored in a system must go through a process.
- All processes in a DFD go to another process or a data store
  - No “dead ends” or “black holes”
  - No “miracles”

Wrong	Right	Description
		An entity cannot provide data to another entity without some processing occurred.
		Data cannot move directly from an entity to a data story without being processed.
		Data cannot move directly from a data store without being processed.
		Data cannot move directly from one data store to another without being processed.

Balancing DFD

When performing top-down decomposition to a DFD to lower level DFDs, the inputs and outputs must be conserved between levels of DFDs. For example, level n & n+1 must have the same inputs and outputs



Excellent DFD Tutorials

https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd

https://www.youtube.com/watch?v=ztZsEI6C-ml

https://www.youtube.com/watch?v=6VGTvgaJIlM

Excellent Free DFD Drawing Tool

www.lucidchart.com