# APS145
# Applied Problem Solving & Computational Thinking

## Pseudo Code and Flowcharting

# Introduction to Pseudo Code and Flowcharts

Most popular methods used to describe and communicate processes:

- **Pseudo Code (Step-1!)**
  - In readable sentence form
  - A list of described steps in the required order to accomplish the desired outcome

    **** The most popular and efficient method (especially for programmers)***

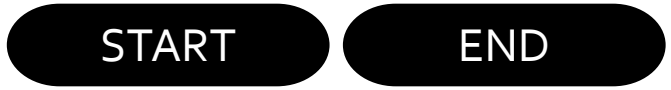
- **Flowcharts (Final Step)**
  - A pictorial/illustrative view of the process using special symbols
  - Very effective in illustrating process to a wider audience (end-users, management, directors etc…)
  - Ideal for final process delivery, but is more time consuming and not easy to maintain (not good during the development process – but is good for small processes)

# FLOWCHART: Introduction (Common Symbols)

These are some of the most common symbols used in a flowchart (there are many others that are more specific, however we will only use these in this course):

**Elongated Oval**: Represents the **START** and **END**

- Begin with a start node, do some process(s), and end with an end node



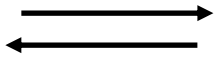

**Rectangle**: Represents a **PROCESS**

- Note: We will be using this symbol for input/output as well – normally based on the type of input/output other more specific symbols would be used


**Diamond**: Represents a **DECISION** (yes/no, true/false)

- Can be used to show up to 3 decision options
- More than 3 options will require a variant of this and will be described later


**Lines/Arrows**: Represents the **DIRECTION** and **FLOW** of the data



# Pseudo Code & Flowcharting: Example-1

## Example 1: Selection (decisions)

You are buying a sandwich at the $1 sandwich sale. You have a choice of a **cold** or **toased** sandwich. Cold sandwiches get lettuce added (toasted does not have any lettuce).

Pseudo Code

1. Pay $1 for a sandwich
2. Prepare Sandwich
3. Specify **cold (a)** OR **toasted (b)**
   a) Cold: Add lettuce
   --------- *OR* ---------
   b) Toasted: Toast sandwich
4. Put on tray for pickup
5. Pickup tray
6. Exit

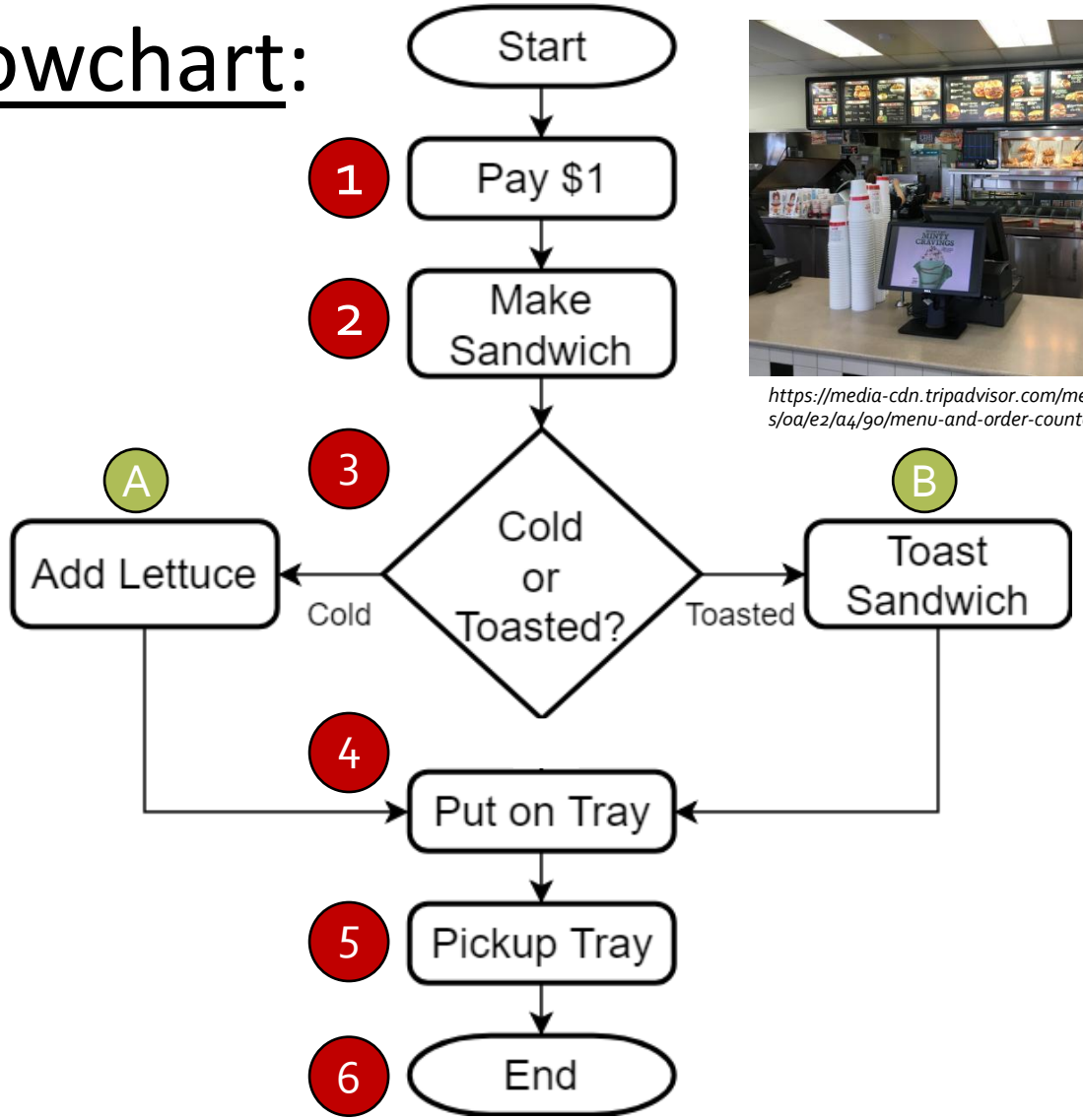
*https://media-cdn.tripadvisor.com/media/photo-s/0a/e2/a4/90/menu-and-order-counter.jpg*

# Translate: Pseudo Code to a Flowchart

## Pseudo code:

1. Pay $1 for a sandwich
2. Prepare Sandwich
3. Specify **cold (a)** OR **toasted (b)**
   a) Cold: Add lettuce
   --------- *OR* ---------
   b) Toasted: Toast sandwich
4. Put on tray for pickup
5. Pickup tray
6. Exit

## Flowchart:






https://media-cdn.tripadvisor.com/media/photo-s/0a/e2/a4/90/menu-and-order-counter.jpg

# Testing Process

## Example-1 Testing Scenarios:

1. Order a cold sandwich

### Expected Outcome

- Make sure lettuce is added
- Should NOT be toasted

1. Order a toasted sandwich

### Expected Outcome

- Make sure lettuce is NOT added
- Should be toasted

https://media-cdn.tripadvisor.com/media/photo-s/0a/e2/a4/90/menu-and-order-counter.jpg

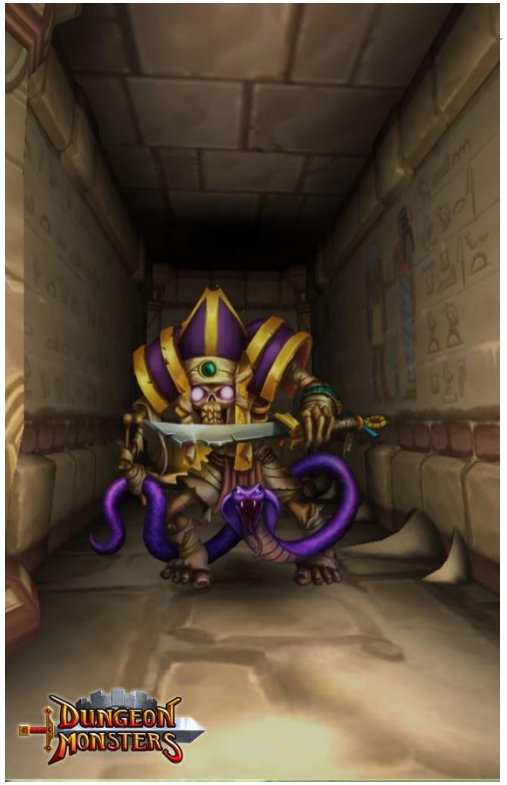
# Pseudo Code & Flowcharting: Example-2

**Example 2: Iteration (repeating) and Selection (decisions)**

Your playing a dungeon game. You have a limited number of lives. When you encounter a monster you fight and there are only two outcomes: You **die** (lose a life) or you **live** (get points). You can optionally end the game after a fight, but the game ends no matter what if you run out of lives.

Pseudo Code

1. Explore Dungeon
2. Encounter Monster
3. Fight (outcome):
   a) **Die**: Reduce Lives
   b) **Live**: Get Points
4. Have Lives:
   a) **Yes**: Continue (step:5)
   b) **No**: End (step:6)
5. Quit:
   a) **Yes**: End (step:6)
   b) **No**: Explore Dungeon (step:1)
6. End

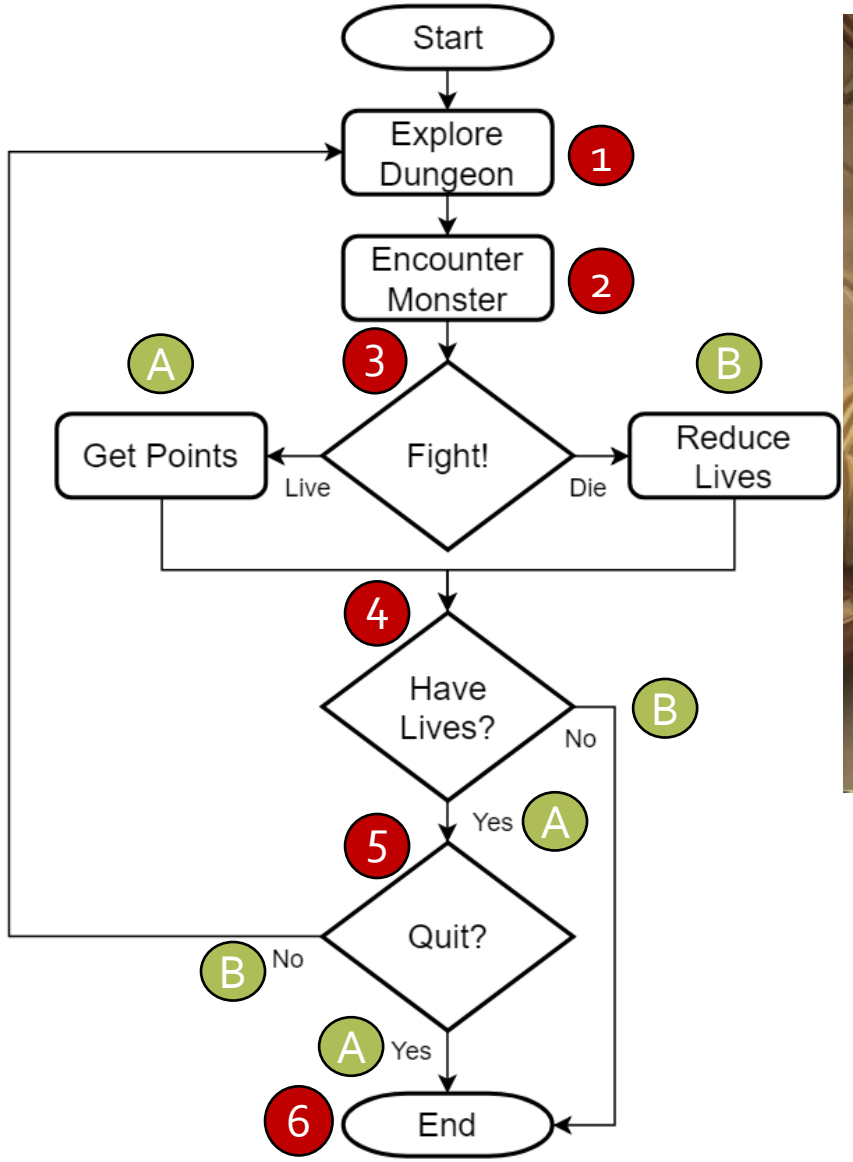


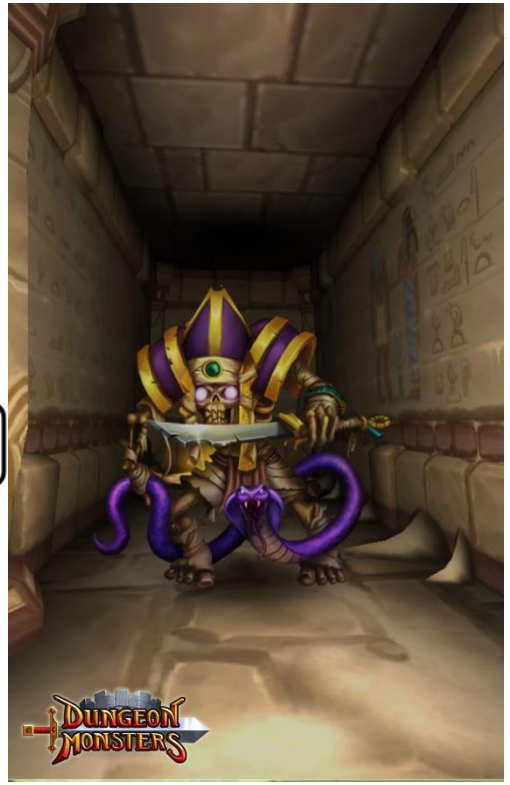

*http://www.dungeonmonsters.com/presskit/dungeon_monsters/images/Egypt5.png*

# Translate: Pseudo Code to a Flowchart

Pseudo Code

1. Explore Dungeon
2. Encounter Monster
3. Fight (outcome):
   a) **Die**: Reduce Lives
   b) **Live**: Get Points
4. Have Lives:
   a) **Yes**: Continue (step:5)
   b) **No**: End (step:6)
5. Quit:
   a) **Yes**: End (step:6)
   b) **No**: Explore Dungeon (step:1)
6. End



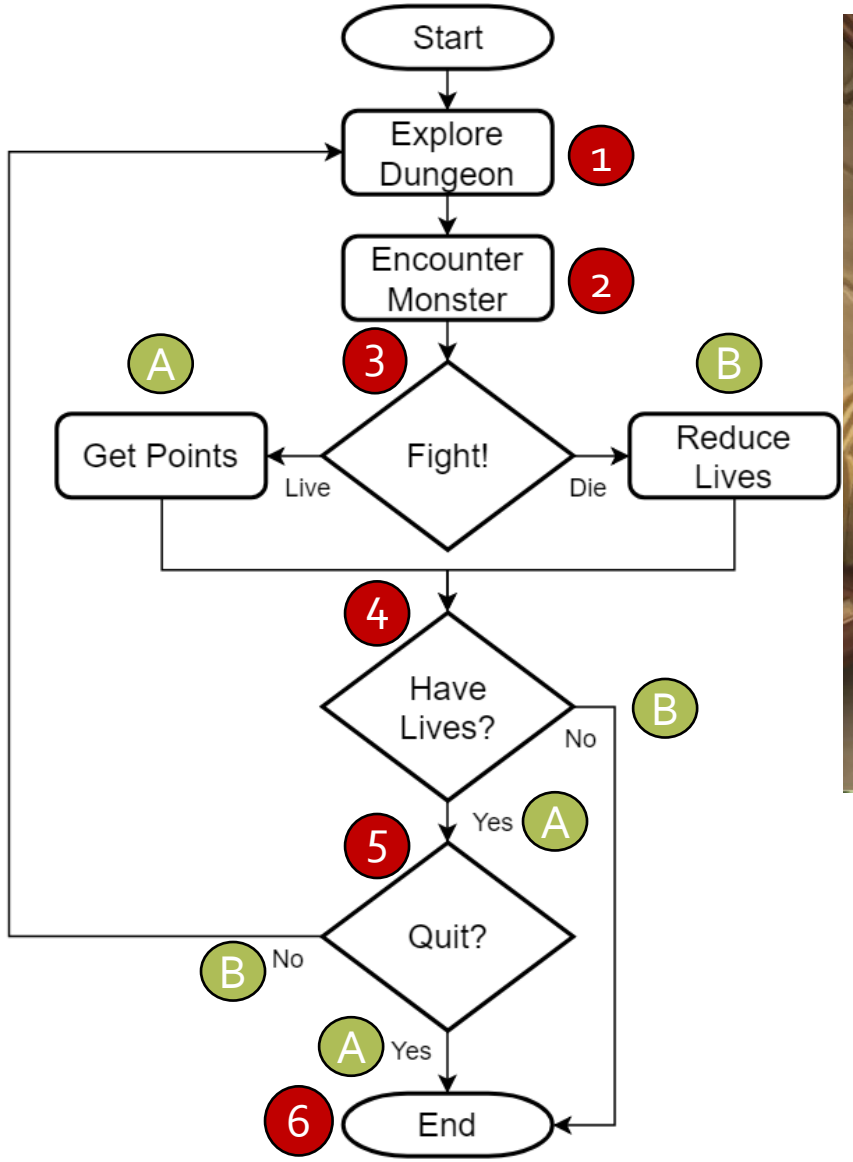



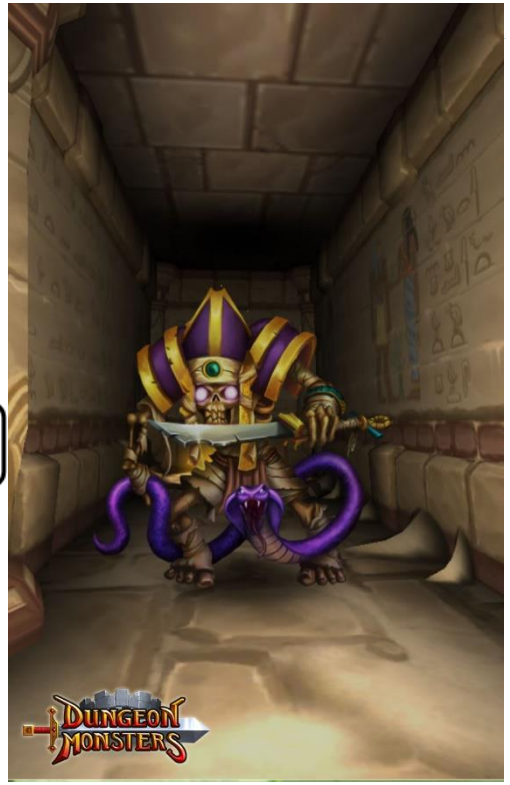

*http://www.dungeonmonsters.com/presskit/dungeon_monsters/images/Egypt5.png*

# Testing Process

Example-2 Testing Scenarios:

1. Start with 2 lives
   - Fight: Live
   - Quit: Yes
2. Start with 2 lives
   - Fight: Live
   - Quit: No
   - Fight: Die
   - Quit: Yes
3. Start with 2 lives
   - Fight: Die
   - Quit: No
   - Fight: Die

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