

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

STARTEND

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

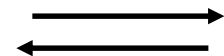
Action/Process

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

Decision

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 **toasted** 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



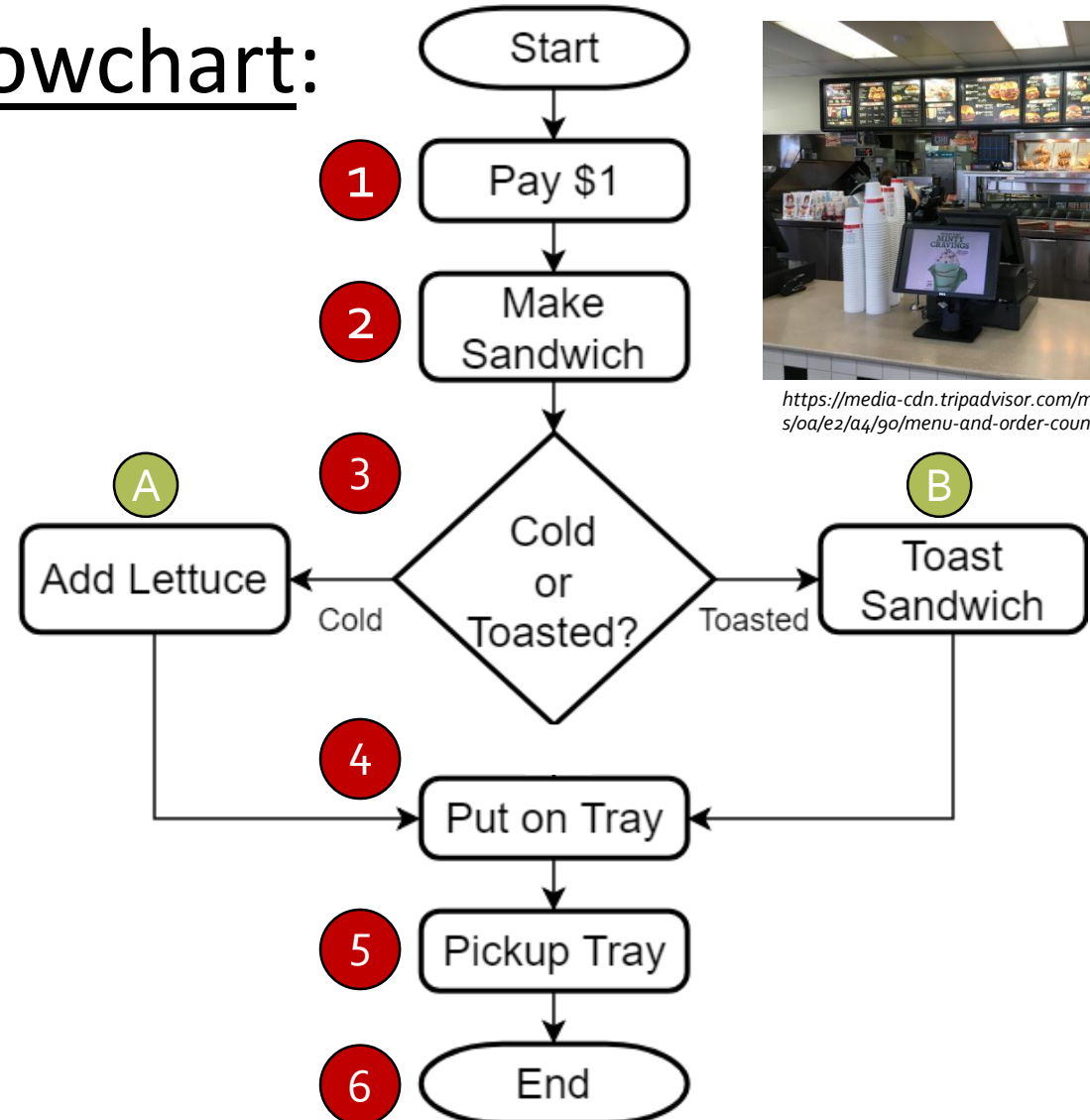
<https://media-cdn.tripadvisor.com/media/photo-s/0a/e2/a4/90/menu-and-order-counter.jpg>

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

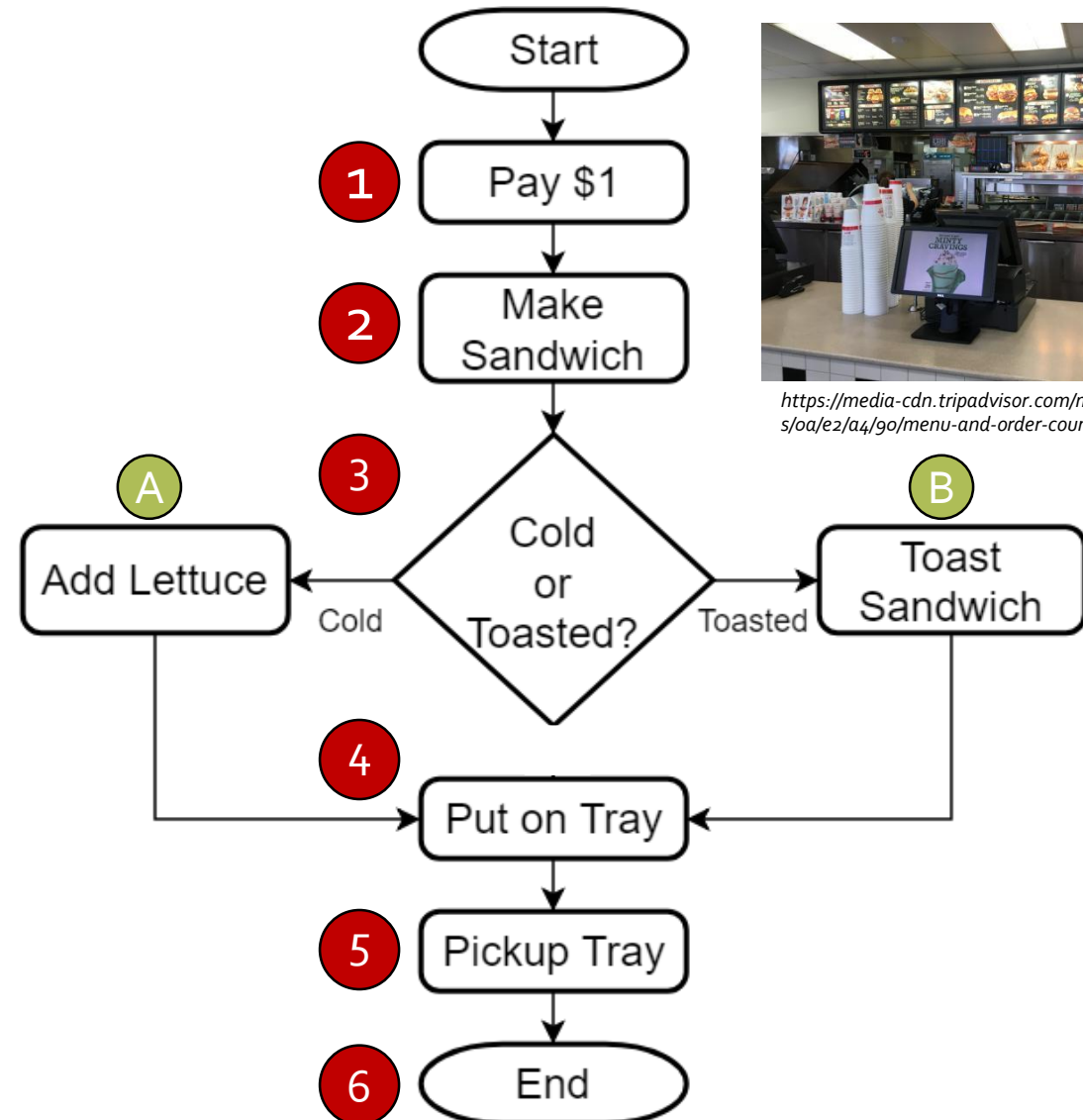
Expected Outcome

- 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



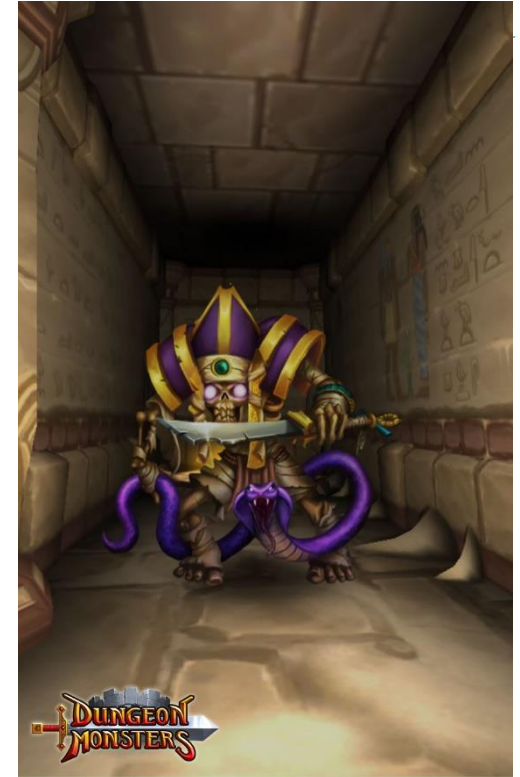
Pseudo Code & Flowcharting: Example-2

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

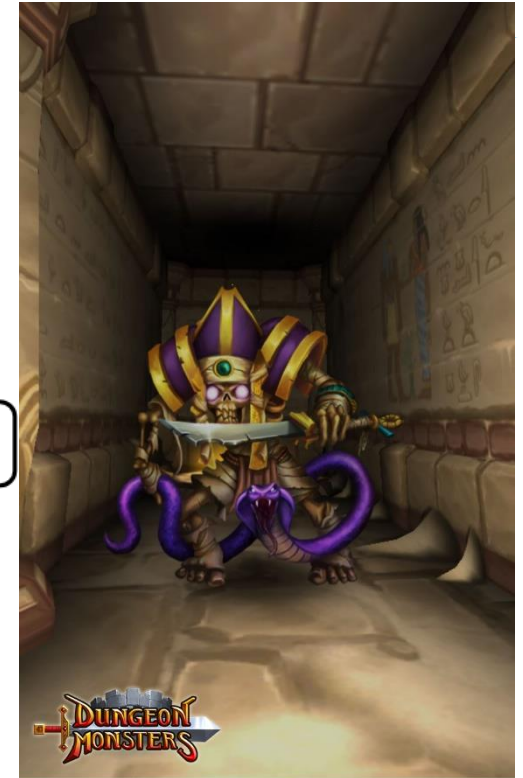
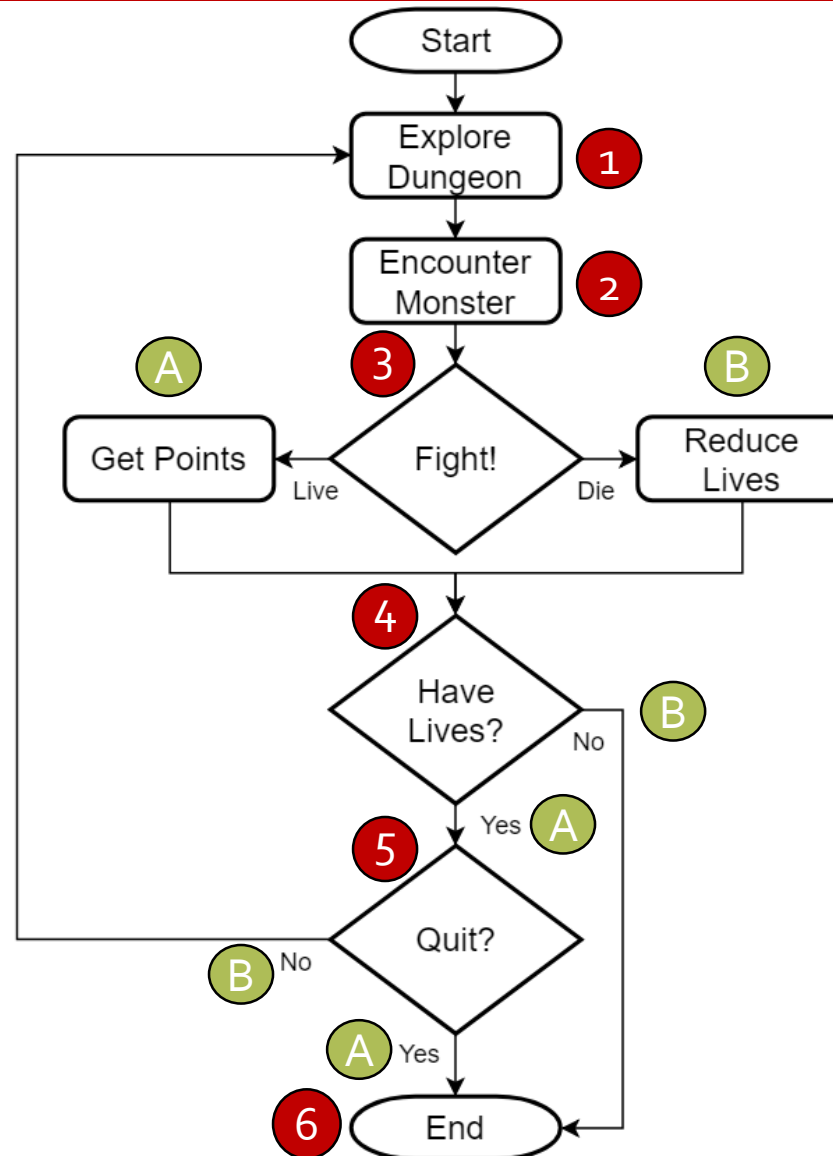


http://www.dungeonmonsters.com/presskit/dungeon_monsters/images/Egypt5.png

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

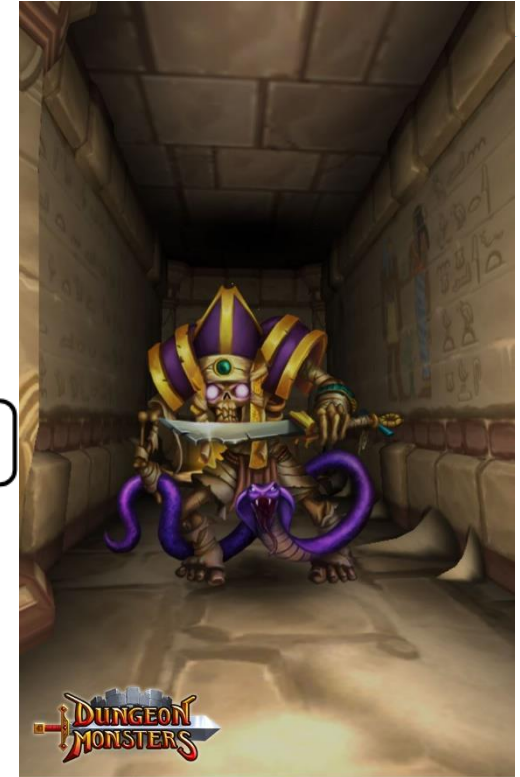
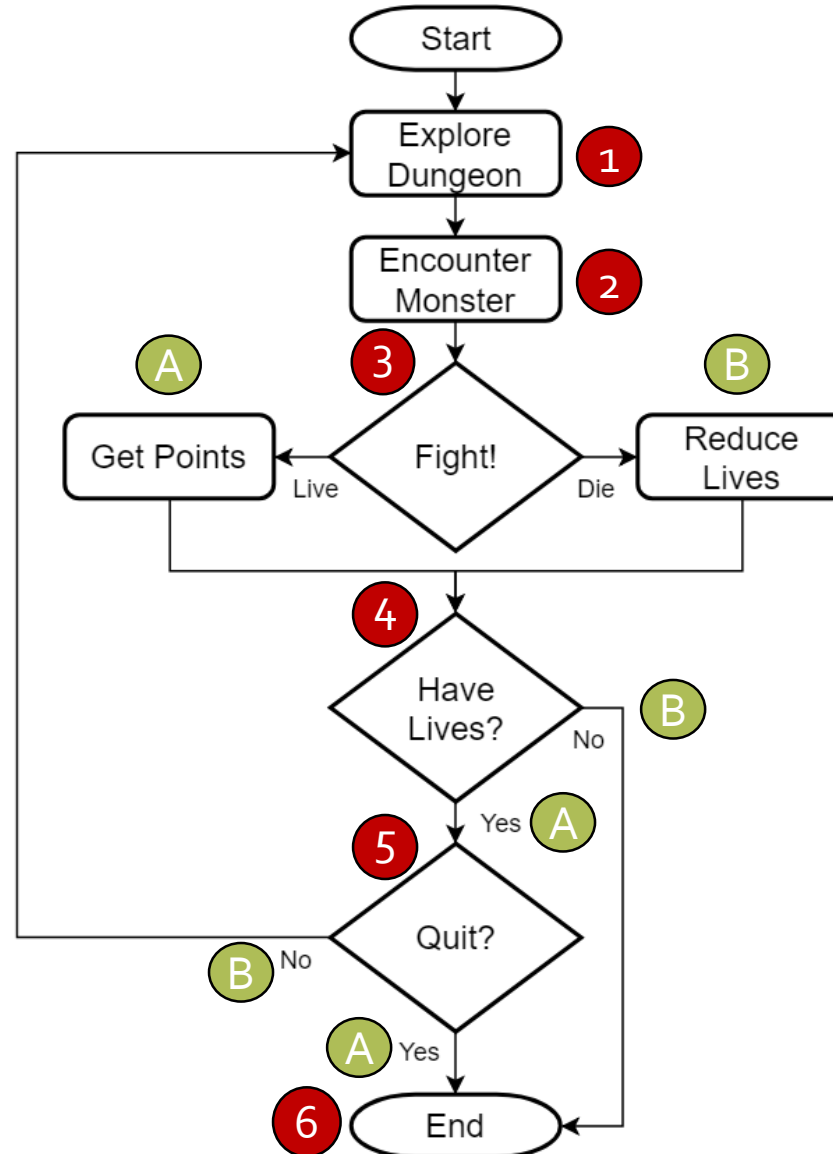


http://www.dungeonmonsters.com/presskit/dungeon_monsters/images/Egypt5.png

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



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