

Problem Solving

Thinking like a 1337 programm3r

The Most Common Mistake

- Computers and people “think” about problems very differently
- Humans
 - Can analyse several different approaches to a problem and choose the best one
 - Can adapt to situations if not explicitly told to do so
 - Constantly look for ways to make repetitive tasks more efficient
 - Will do tasks out of order to accommodate for external factors
 - General
- Computers
 - Cannot adapt to situations in ways it not told
 - Will do exactly what it is told and will not do anything it was not told to do
 - Must work in clear, predefined instructions and in the order set by the programmer
 - Granular
- The most common mistake new programmers make is to try and program a computer as if it was a human being.

Example

Task: Write code that drives the robot forwards and stops it gently after it has driven a certain distance based on the value of a sensor.

- Incorrect (and super common): trying to program the entire task into one big instruction without a clear idea on what that instruction will look like
 - New programmers often get stuck, unable to realize their thoughts into code
- Break the task down into a large list of small steps that are easy to program
 - The small steps are easy for programmers to grasp, less likely to get lost in complicated logic
 - Leads to cleaner, more efficient, and more readable code

Example (2)

How would we break down the previous example into a list of easy-to-program steps?

1. Tell the robot to move forwards at a set speed
2. Check the distance of the sensor
 - a. If the sensor is in a defined threshold “close”
 - i. Cut the speed in half
 - b. If the robot is in a defined “there” threshold
 - i. Stop the robot
 - ii. End program
 - c. If the robot has passed the threshold
 - i. Set robot direction to reverse
3. Loop steps 1 and 2

Let's try something easier

PPnJ activity

Control Flow

- A visual way to represent the “steps” that problems are broken into
- Not needed for every program you write, but at least think about this before

Control flow symbols

Start



Process/Statement



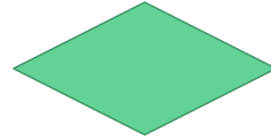
Document



Sub Process



Decision



Wrapping up

- Example on board
- Homework: Draw a control flow diagram double knotting your shoelaces.