

What is a Program?

- A precise set of instructions
- Like the rules for a game, or how to build something, or directions to your house
- Can someone give me the directions to their house?

Directions to my house

- Go to the UCSC campus entrance at Bay and High.
- Enter the campus.
- At the first chance to turn left, turn right.
- Turn right at the next intersection.
- Immediately go left.
- Park near the playground.

Tic-Tac-Toe

- Draw a big #
- First player draws an X in one square.
- Second player draws an O in some square.
- Continue until someone has three letters in a row or diagonal, or all the squares are filled.

What can computers understand?

- A computer probably couldn't follow the instructions we just gave for getting to someone's house or playing tic-tac-toe.
- Different computers have different basic operations they can perform, like addition, subtraction, draw a line, etc.
- A Compiler converts our programs into the things a computer can understand.

Software Life Cycle

- **Specify** the requirements
- **Analyze** the requirements
- **Design** the algorithm (solution)
- **Implement** the algorithm as a program
- Test and verify
- Maintain and update

Fetch the newspaper: Specification

Starting from a known home position, move outside, locate the newspaper, and bring it to the kitchen table (another known location), then return to the home position.

Fetch the newspaper: Analysis

Input: Layout of the house, especially the location of the front door, the table, and the home location.

Output: Servo commands to move the robot, pick up the paper etc.

Fetch the newspaper: Design

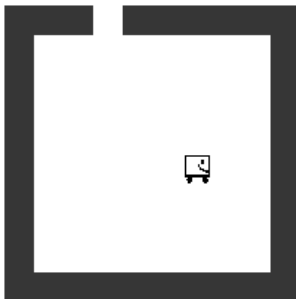
- Go outside
- pick up the paper
- go inside
- put the paper on the table
- return to home position

revised design - pseudocode

```
go to the front door
open the door
go through the doorway
close the door
locate the newspaper
if found pick it up, else signal an error
go to the front door
open the door
go through the doorway
close the door
go to the table
if no error then release the newspaper
go to the home position
```

```
// actual Java code
public class GetPaper extends Jarel
{
    public void run() {
        goOutside();
        findPaper();
        goInside();
        findTable();
        drop(); // put paper on table
        goToYourRoom();
    }
    void goInside() {
        move(2);
    }
    ...
}
```

Meet Jarel



What can Jarel Do?

- Move
- turnRight
- pickup
- drop
- clearAhead
- getBeeperCount