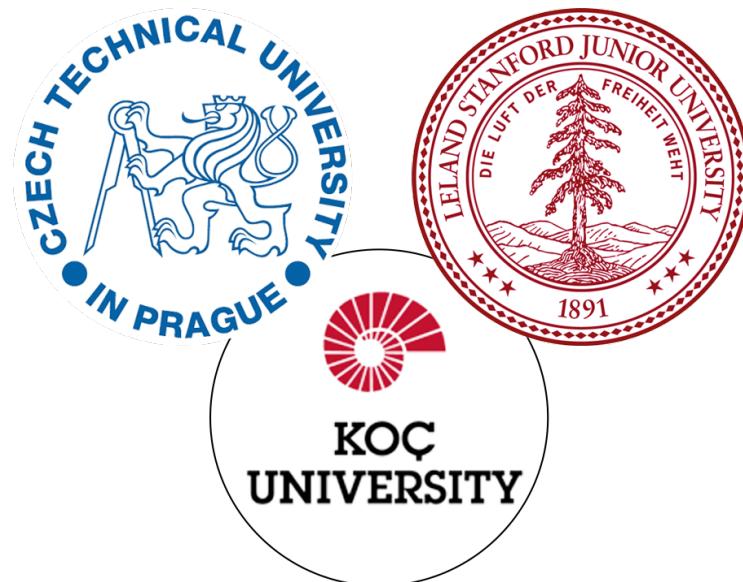


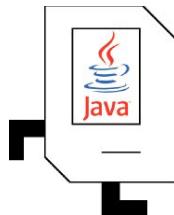
CS Bridge, Lecture 1

Welcome to CS Bridge!



Lecture Plan

- Welcome to CS Bridge!
- Meet Karel the Robot
- For Loops



CS Bridge on Zoom

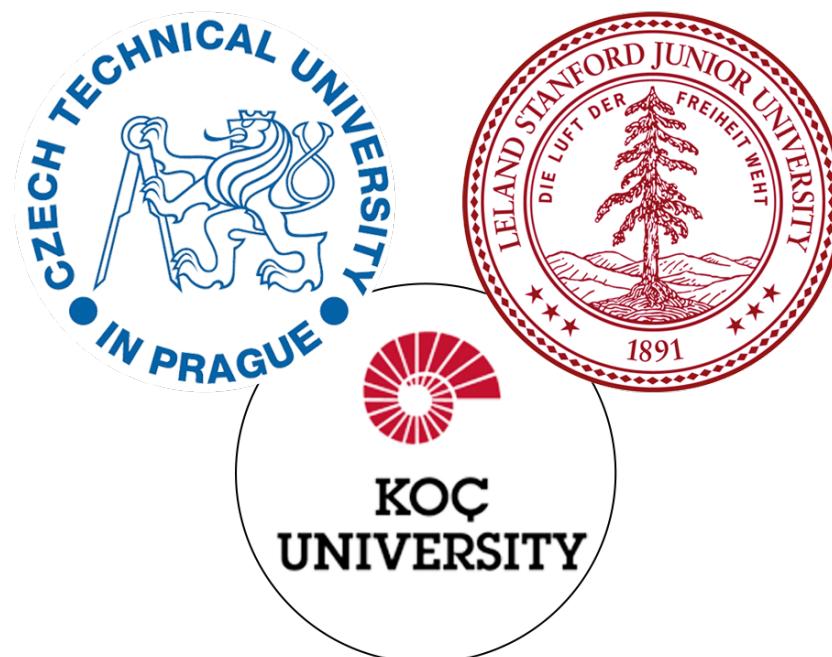
- You are encouraged to share video!
- Post questions/comments/followups in the Zoom chat. We'll take periodic "question breaks" to address them, and have teachers monitoring the chat during the lecture. Everyone is muted by default.

Lecture Plan

- **Welcome to CS Bridge!**
- Meet Karel the Robot
- For Loops

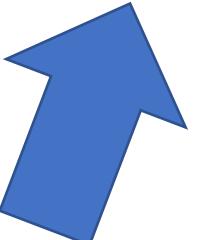
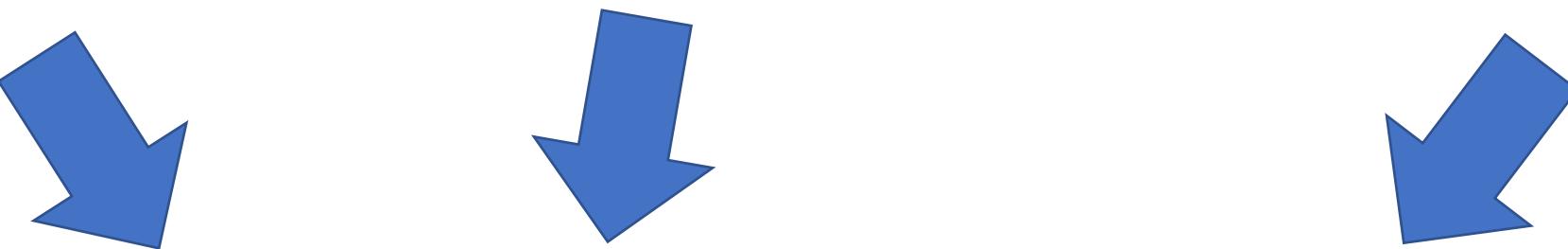
Welcome to CS Bridge!

- We are here to share with you our love for programming!
- An exciting experiment about online teaching
- A joint effort
- **Our goal:** form a community of people to learn and teach programming together



Course Website

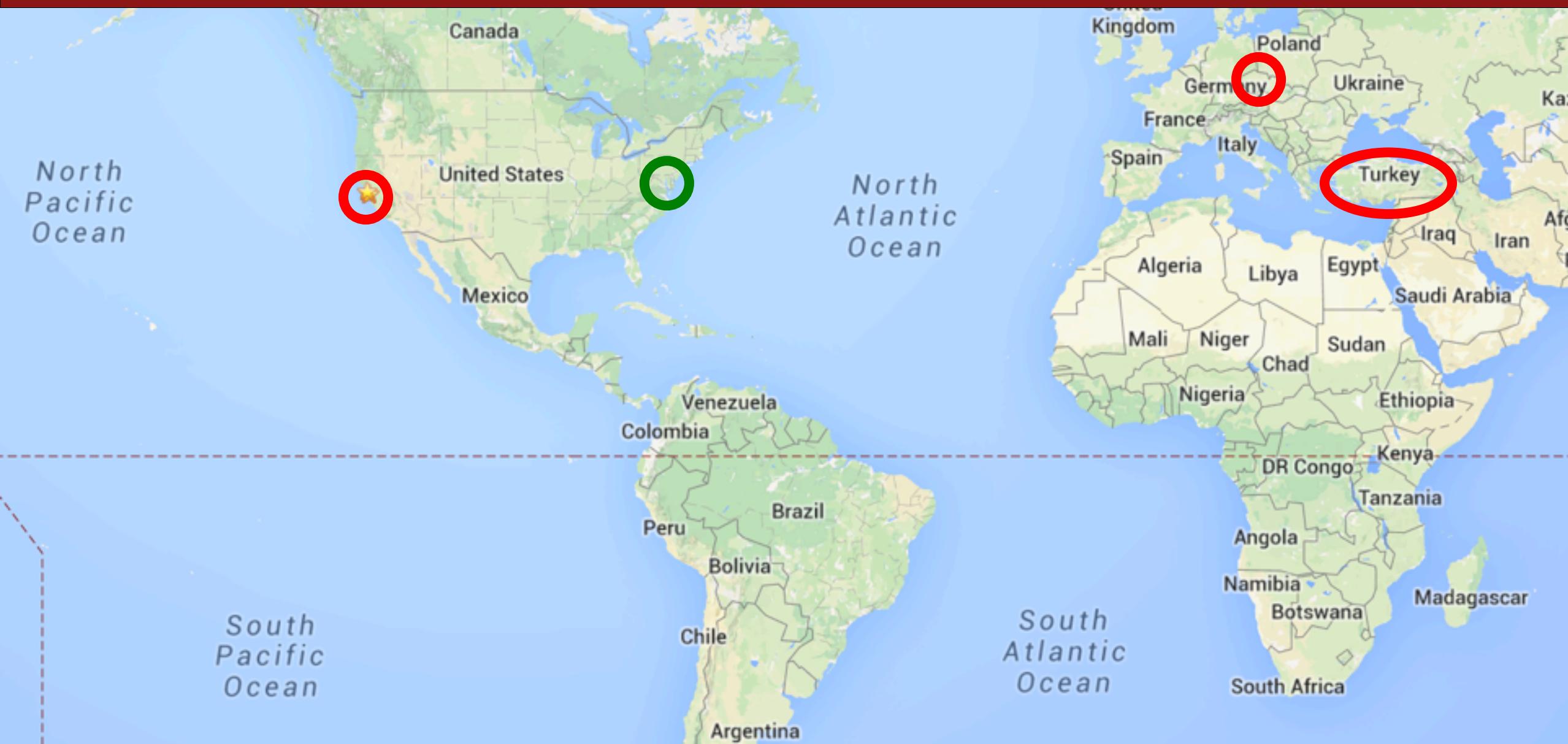
online.csbridge.org



Ed Forum

- We are using a website called Ed for asking and answering questions.
- You can post questions there, and we or other students can answer them.
- If you haven't already, check your email for your invite to join Ed.
- **2 Ed Groups:**
 - **CS Bridge (main group)**
 - **Your Section**

Bridging The World



Nice to meet you!



Hi! I'm Nick.

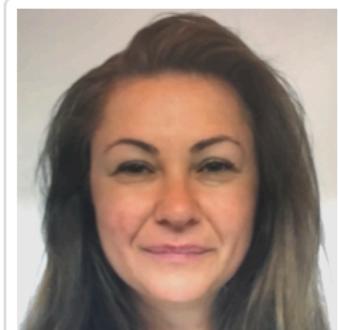
Nice to meet you!



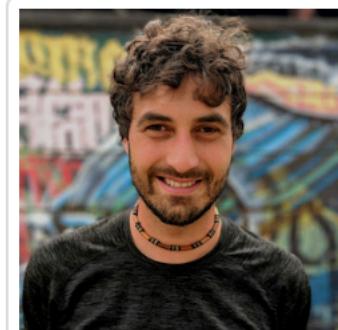
Nick T.



Ondra



Ayca



Chris

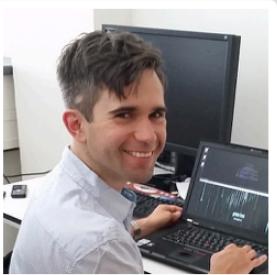


Ceren

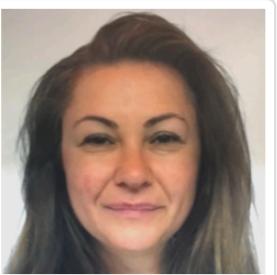
Nice to meet you!



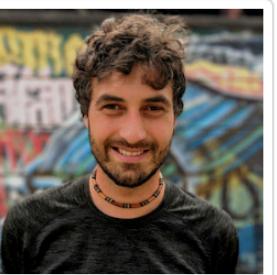
Nick T.



Ondra



Ayca



Chris



Nick M.



Josef



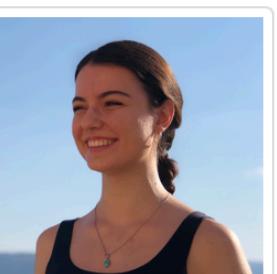
Yosefa



Burcu



Lisa



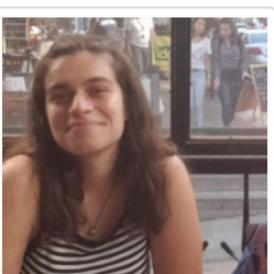
Ceren



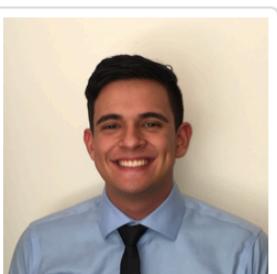
Ahmet



Anna



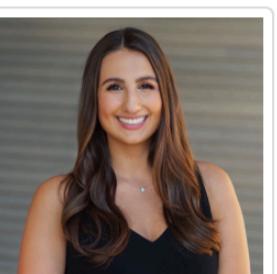
Demet



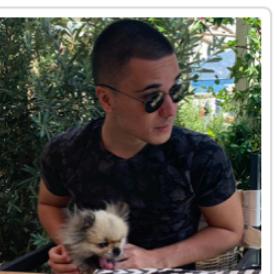
Eddie



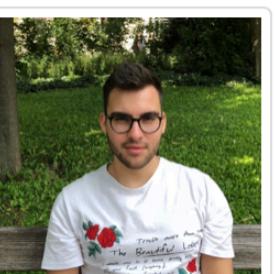
Eliška



Emilia



Emirhan



Eren

Nice to meet you!



Ezgi



Gaby



Gül Sena



Honza



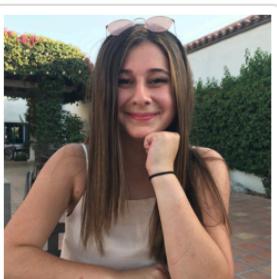
Jan



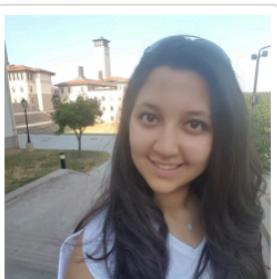
Jaroslav



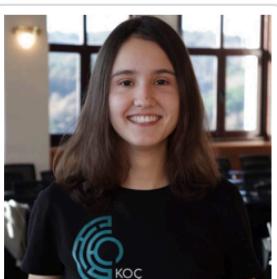
Jillian



Julie



Melis



Necla



Okan



Oya



Ozan



Pinar



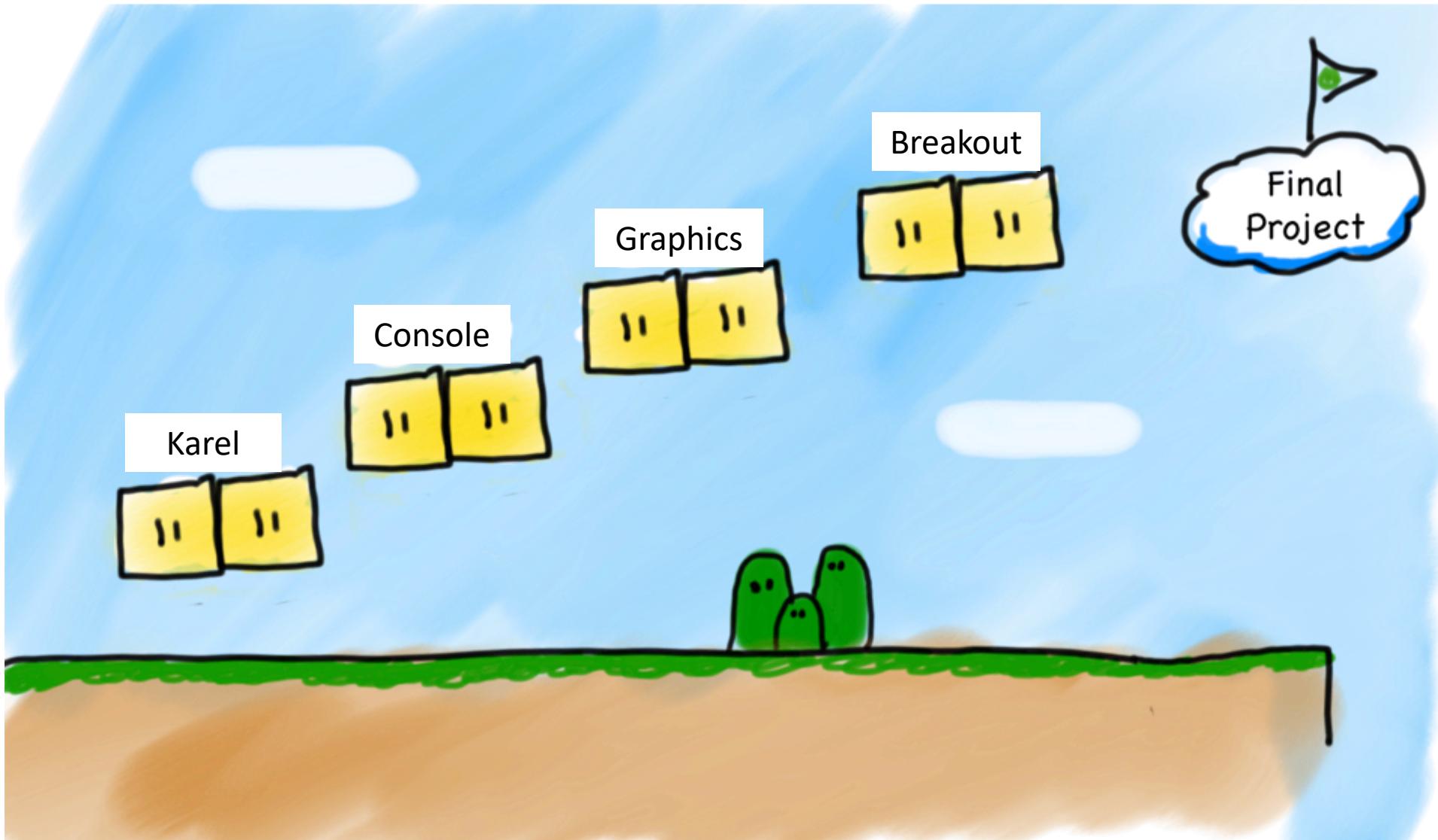
Radek

Section Leader

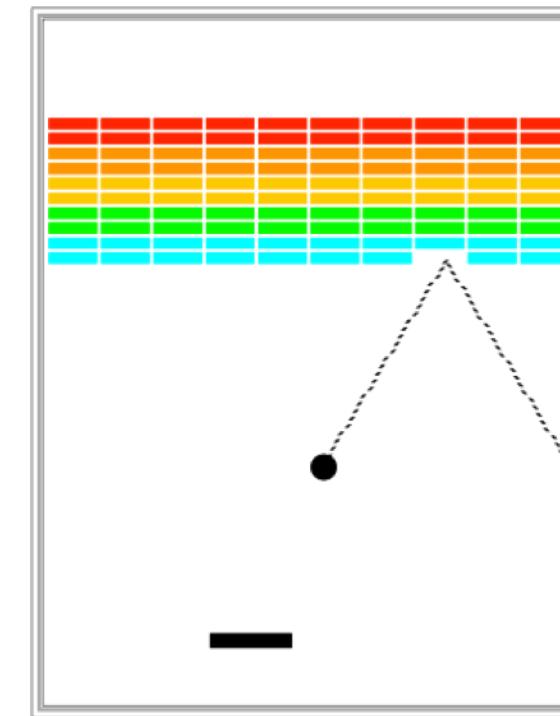
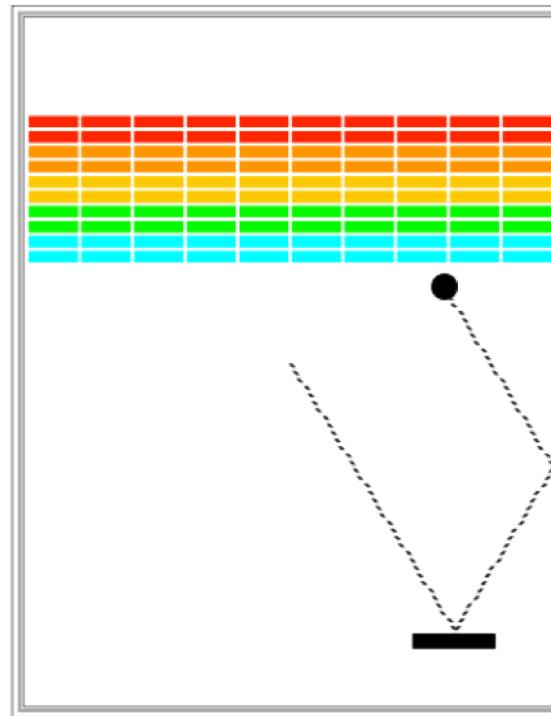
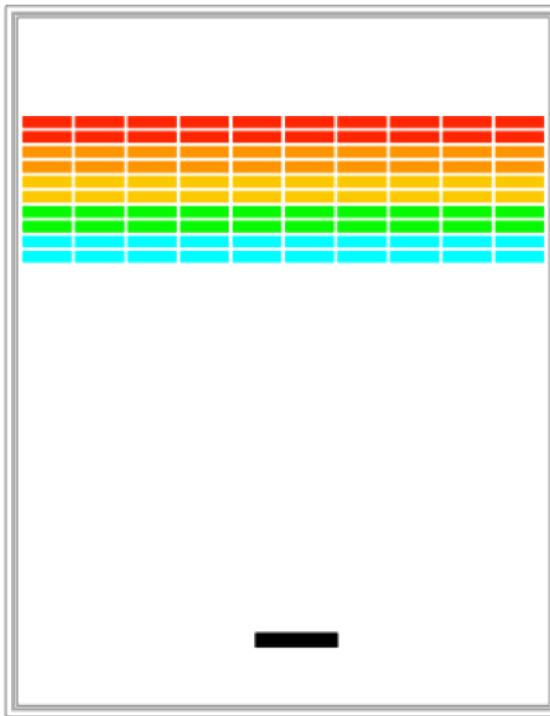
Section Leaders will...

- Lead your daily section and quickstart times
- Help you when you have questions in Office Hours and on Ed
- And much more...

What Will We Learn?



Breakout



Prerequisites

- None! We assume you have never programmed before.

Art Of Computer Science

- CS Bridge covers software engineering principles – much more than just programming
- Writing a program is like writing an essay
 - Need a language (Python)
 - But just knowing the language doesn't make you a good essay writer
- Programming is a tool you can use to do amazing things!



The Joy Of Building



The Joy C



Strive For Everyone To Succeed

- We want all of you to be successful!
- You are not competing against anyone but yourself.
- Learning programming is hard! We are here to help you. Please post on Ed or talk to your Section Leader if you are having trouble.
- **Your most important task:** show up!



CS Bridge Structure – Learn By Doing

- **Lecture** – Where we introduce new concepts!
- **Quickstart / Tea Time** – Right after each lecture with your section group. Time for you to play around with the material on your own computers and mingle with other students.
- **Section** – Right after evening quickstart, with your section group. You will work as a group with your Section Leader to solve practice problems.
- **Office Hours / Work** – Right after the morning quickstart and the evening section. Your own time to work on the projects and sign up for office hours with the Section Leaders if you need help.

At the end of the morning and evening segments, submit your work!

The Website Tells You Where To Go!

CS Bridge

Resources ▾

Projects ▾

Examples ▾

Lectures ▾

Bonus



Intro to Computer Science

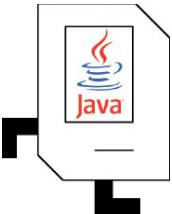
Summer 2020

August 4th to August 20th, online

The program starts soon! To make sure you are ready to go on 4 August, please do the following: 1) Install PyCharm and learn how to use it - information for both can be found by clicking on the "Resources" tab at the top of this page. 2) Click on the Ed account setup link you should have received in an email. Setup your account. Familiarize yourself with [Ed](#) and post questions with screenshots [on Ed here](#) if you need help with the PyCharm installation. 3) Download the "Zoom Client for Meetings" version 5.1.2 [here](#). Please read the information on the website under the resources tab, such as [General Info](#), [Student Frequently Asked Questions](#), and [Section Info](#).

Lecture Plan

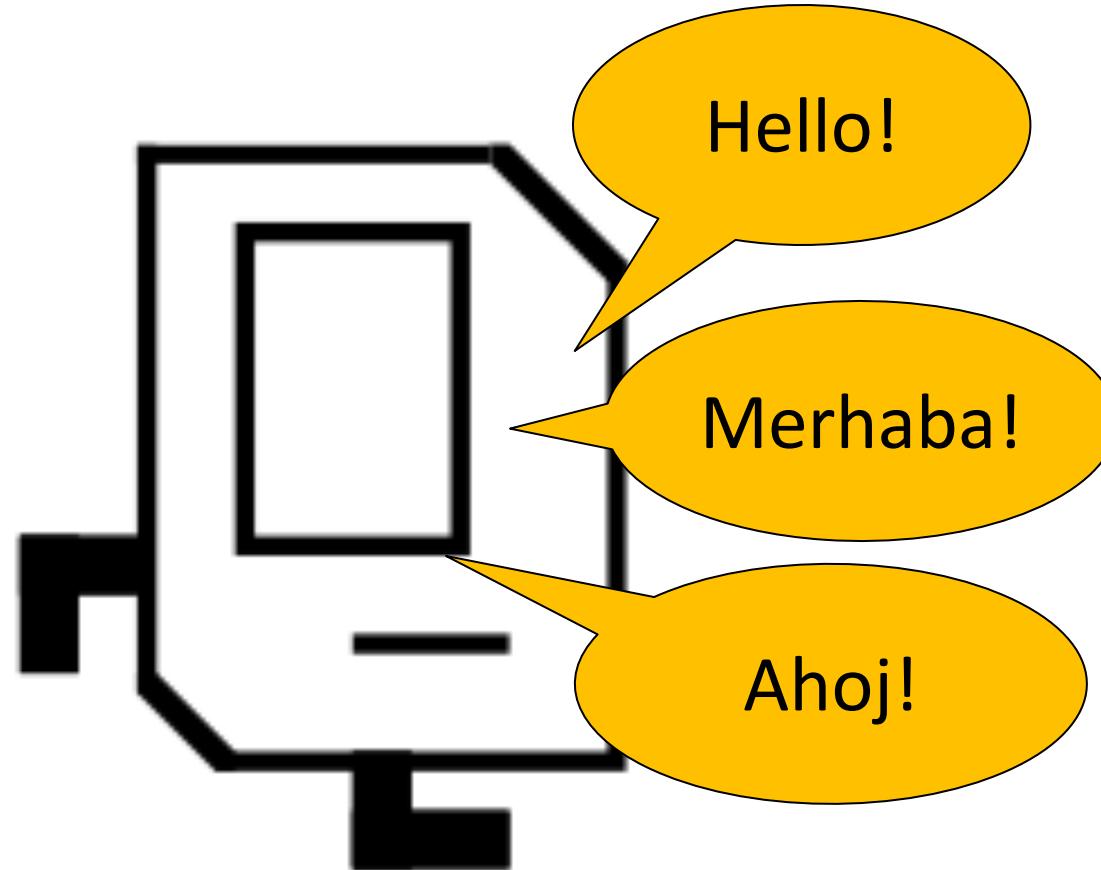
- Welcome to CS Bridge!
- **Meet Karel the Robot**
- For Loops



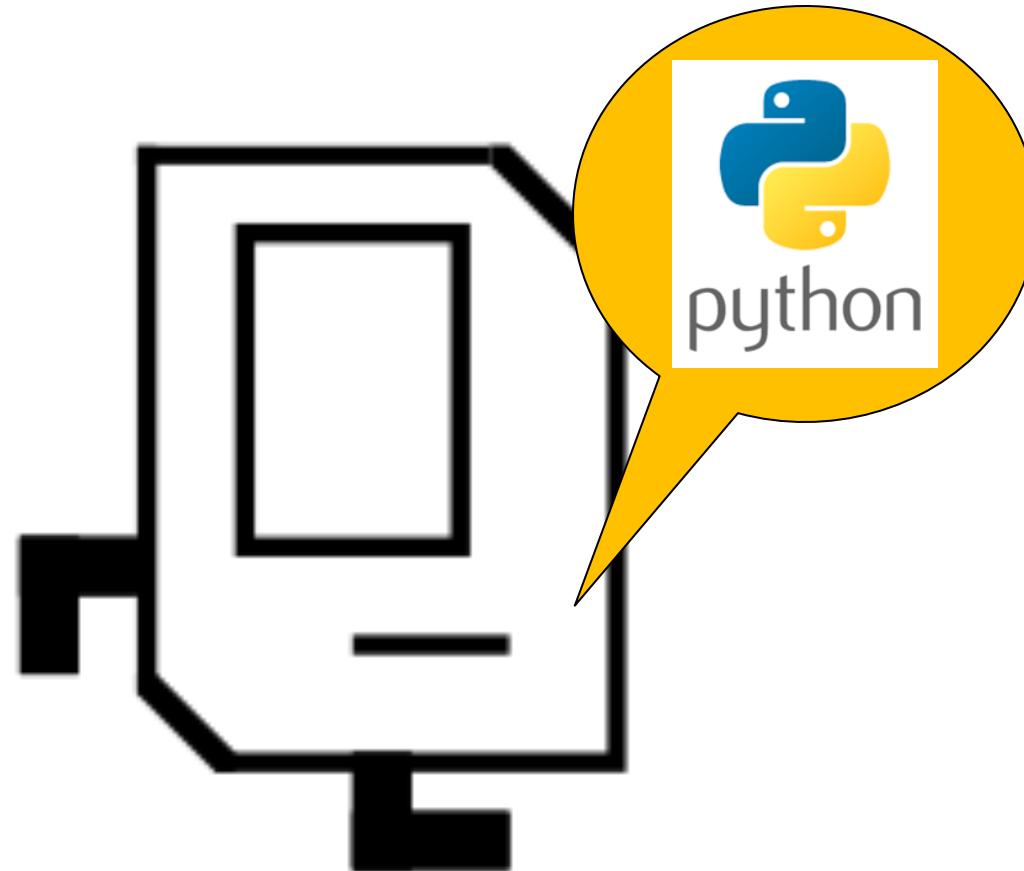
Meet Karel the Robot!



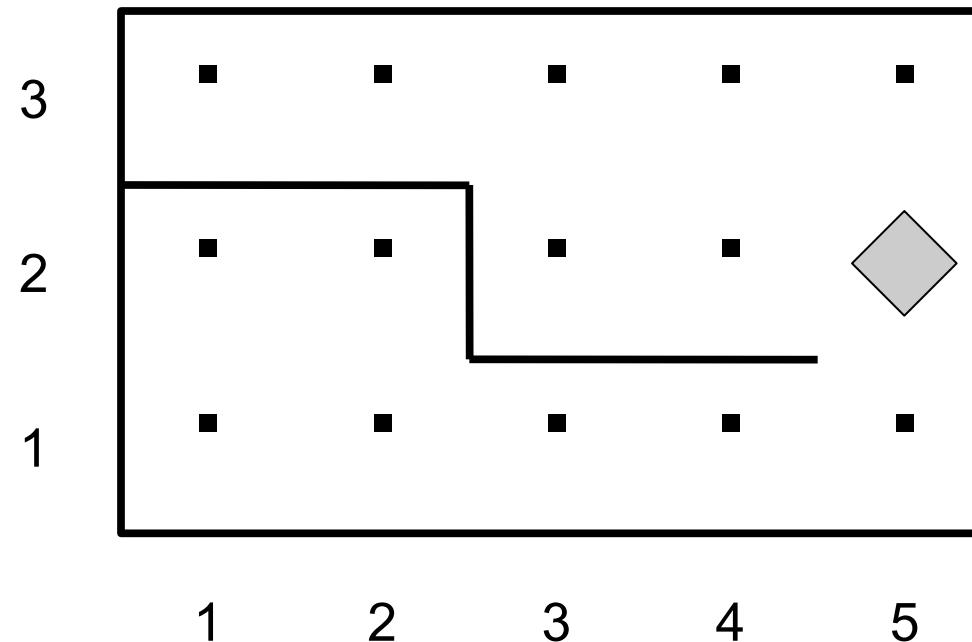
Meet Karel the Robot!



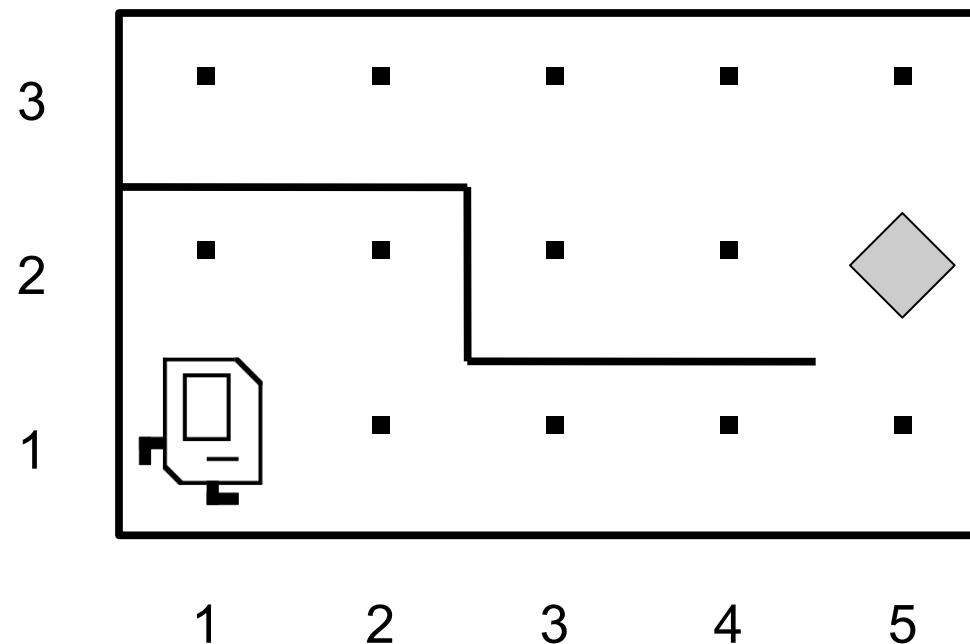
Meet Karel the Robot!



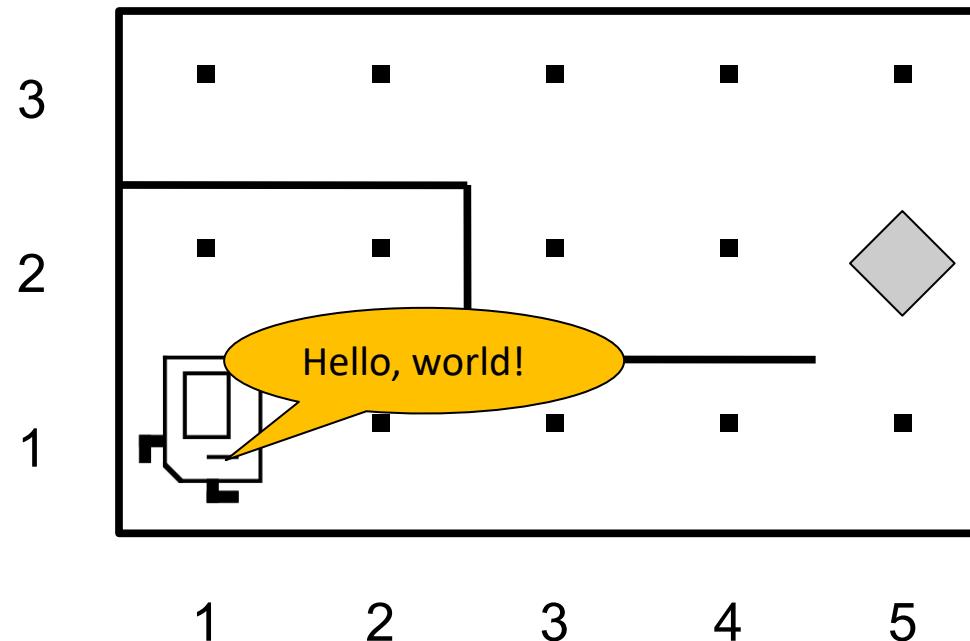
Karel's World



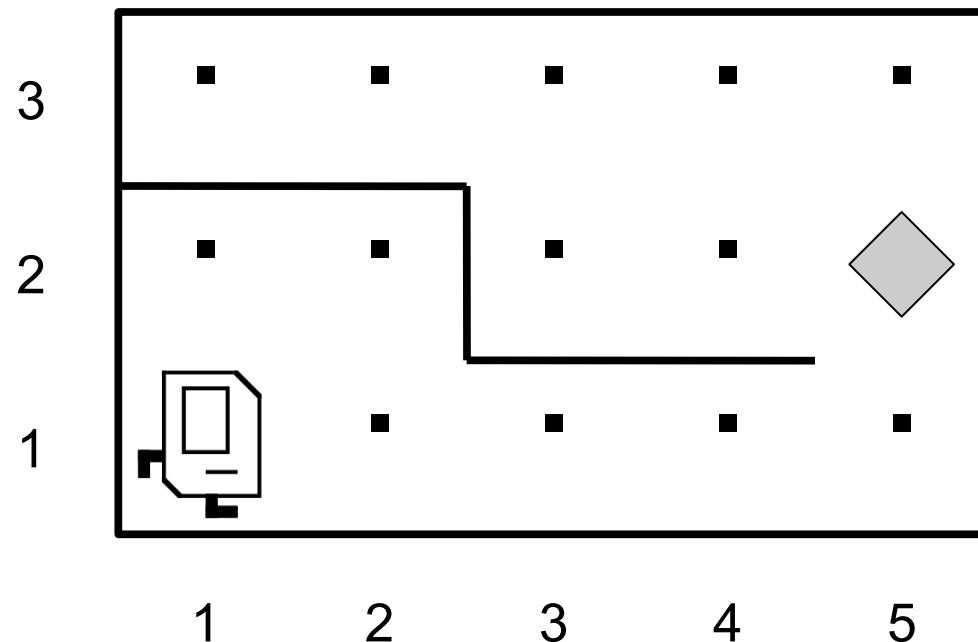
Karel's World



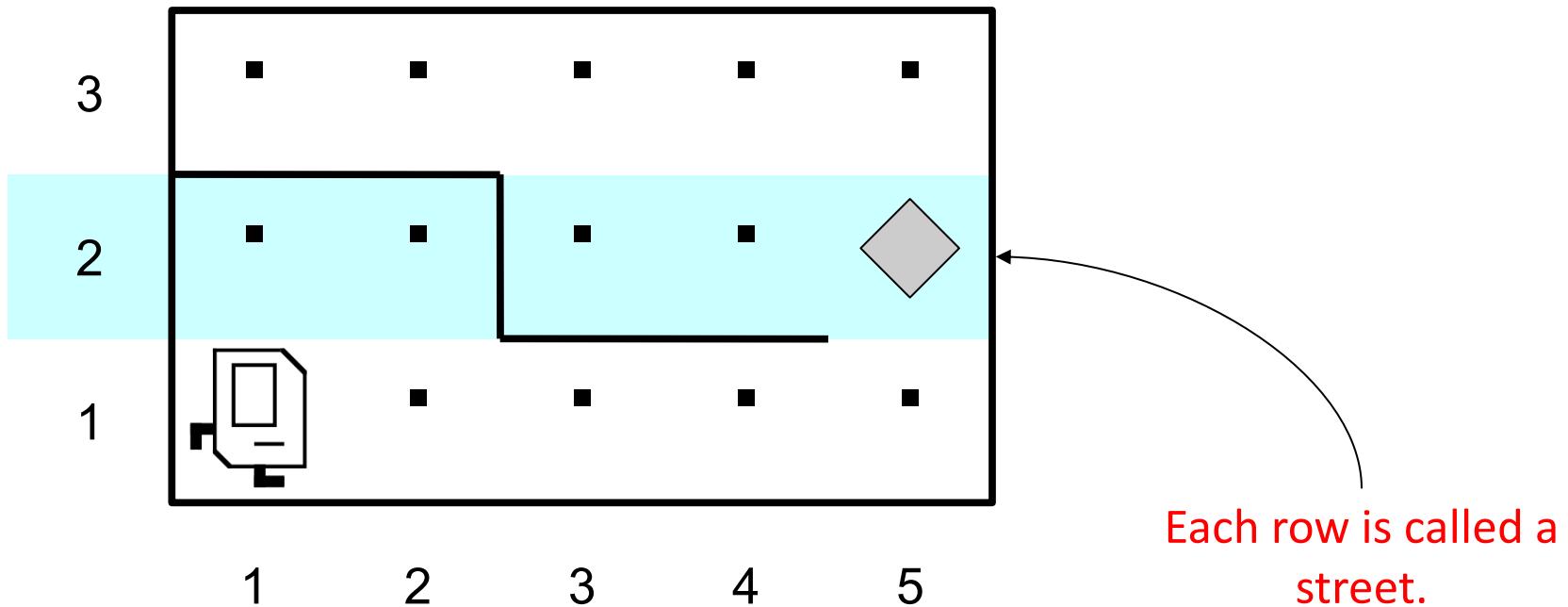
Karel's World



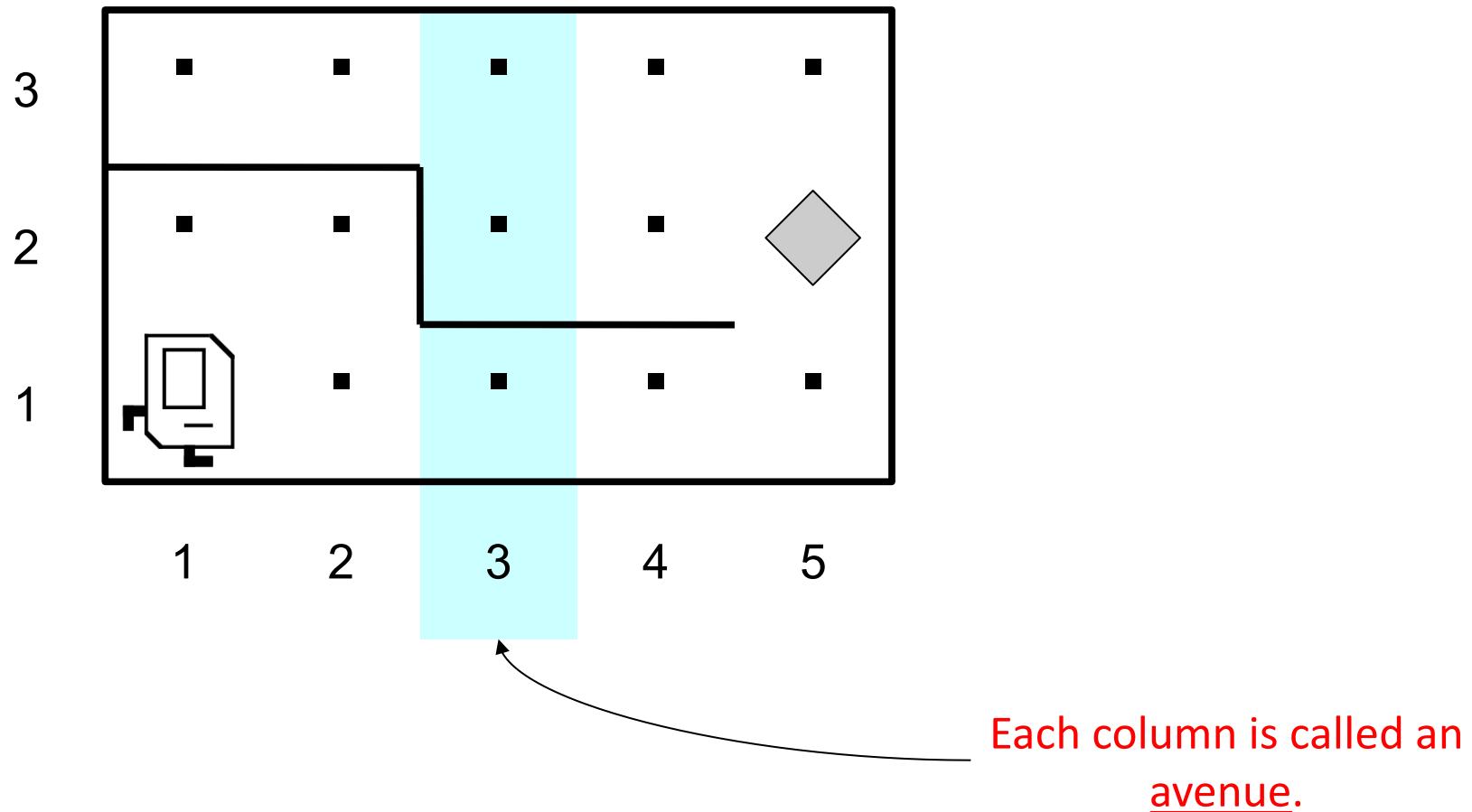
Karel's World



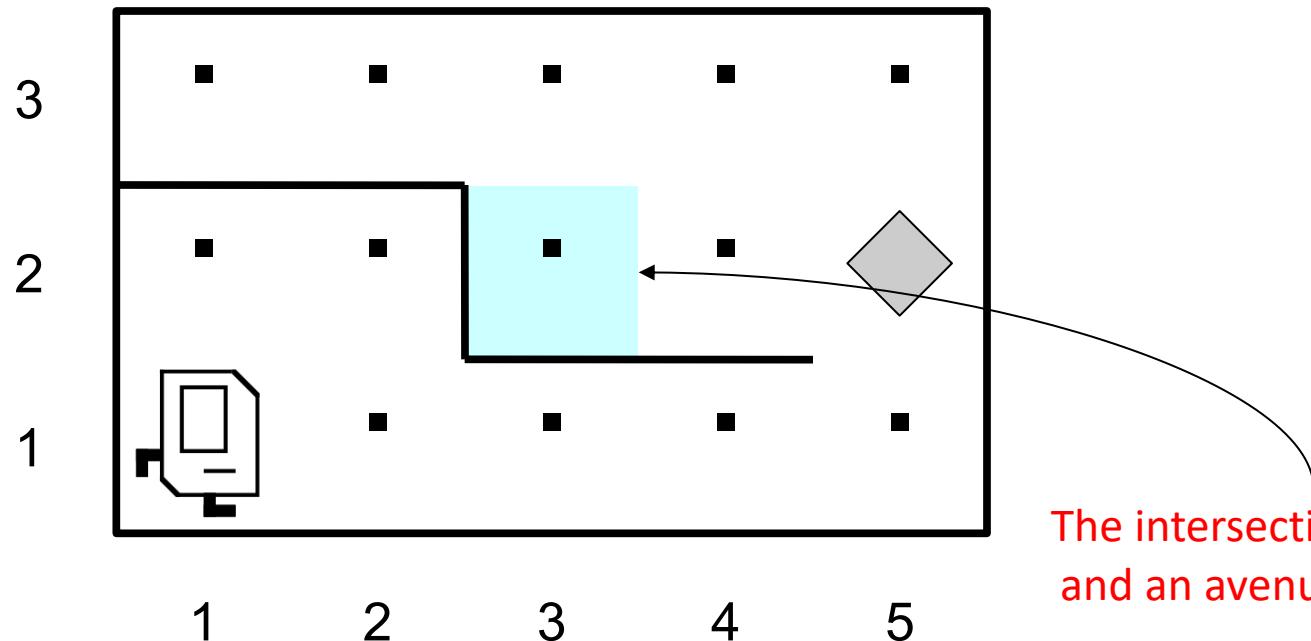
Streets (rows)



Avenues (columns)

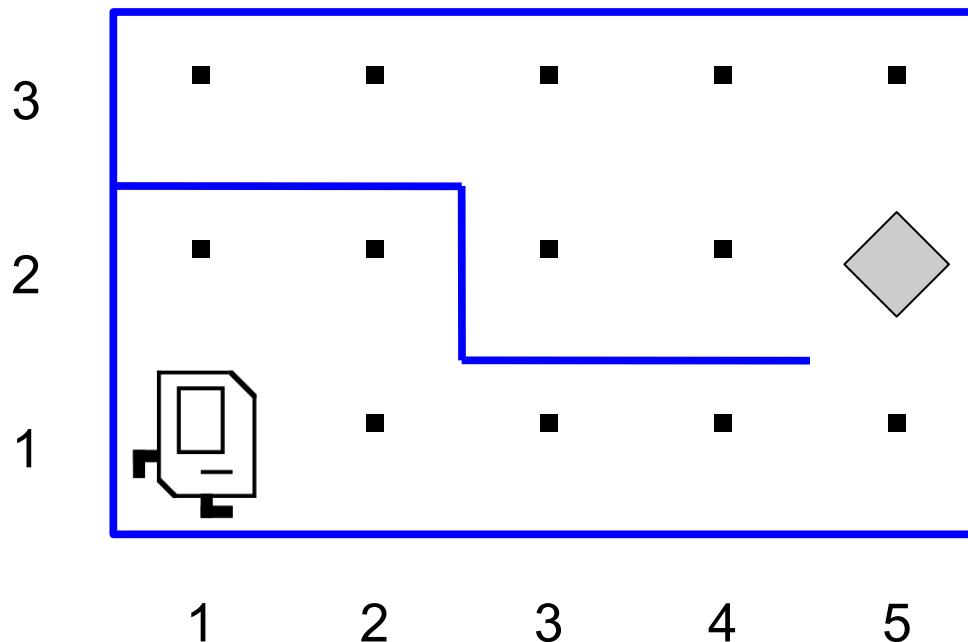


Corners (locations)



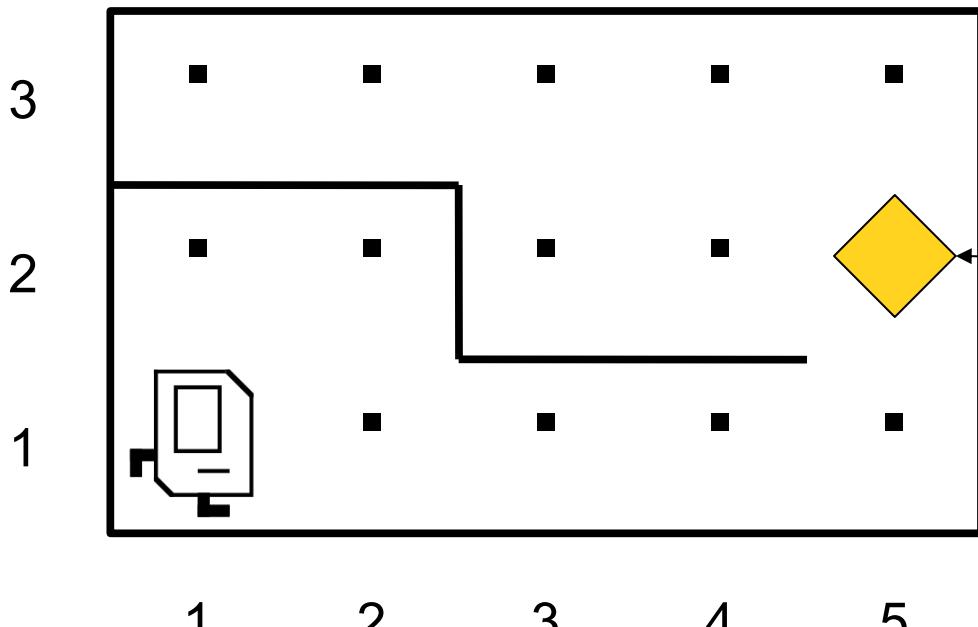
The intersection of a street
and an avenue is a corner.

Walls



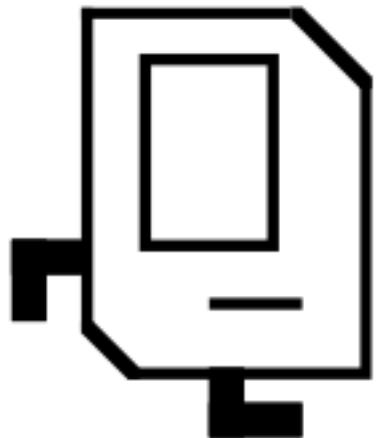
Karel cannot
move through
walls.

Beepers



Beepers mark locations in Karel's world. Karel can pick them up and put them down.

Karel Knows 4 Commands



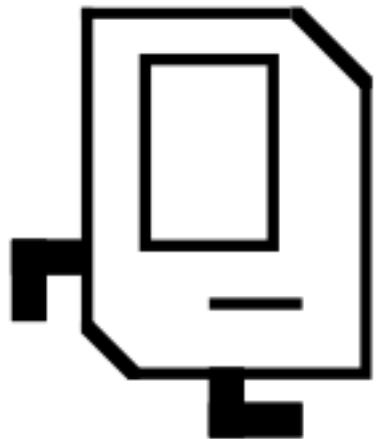
move

turn_left

put_beeper

pick_beeper

Karel Knows 4 Commands



move

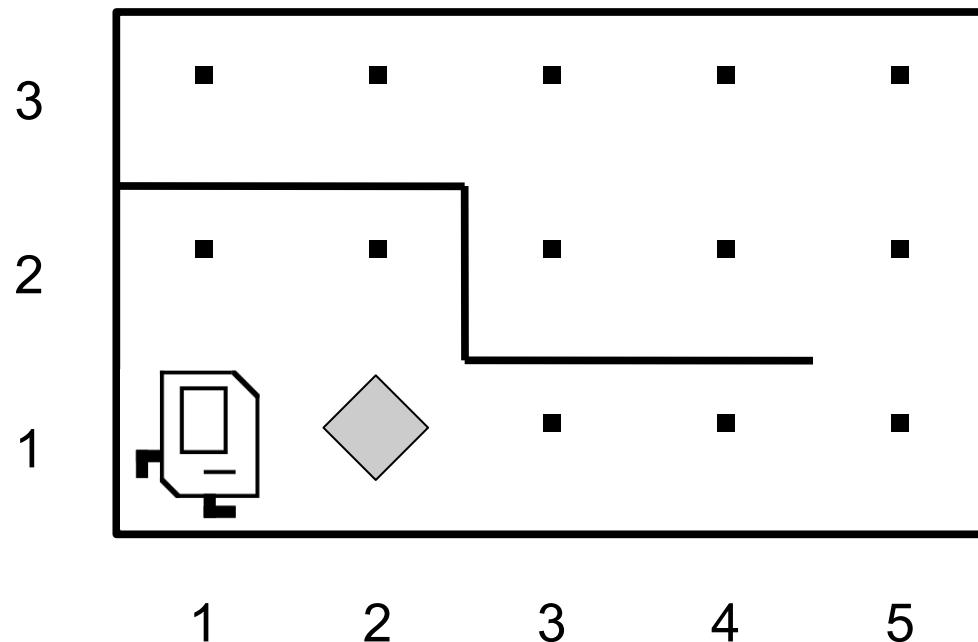
turn_left

put_beeper

pick_beeper

“functions”

Commands: move

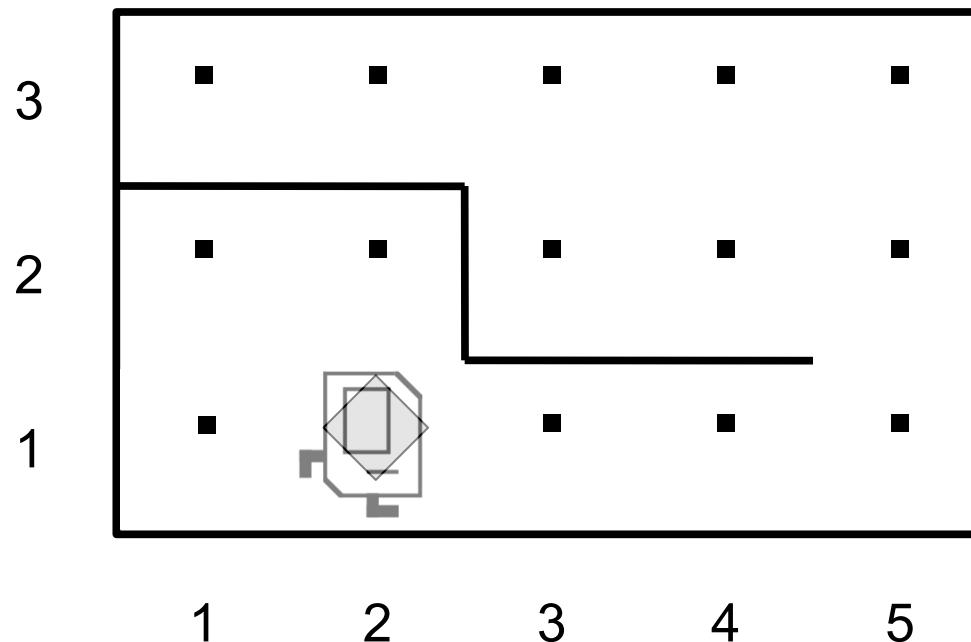


Karel Commands

move
turn_left
pick_beeper
put_beeper

move makes Karel move forward one square in the direction it is facing.

Commands: move

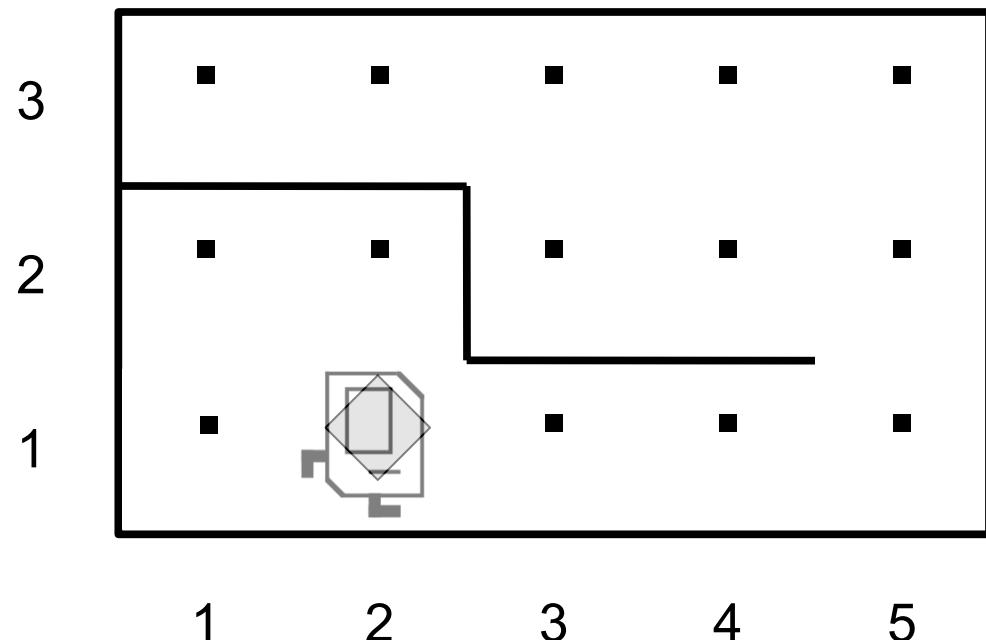


Karel Commands

move
turn_left
pick_beeper
put_beeper

move makes Karel move forward one square in the direction it is facing.

Commands: turn_left

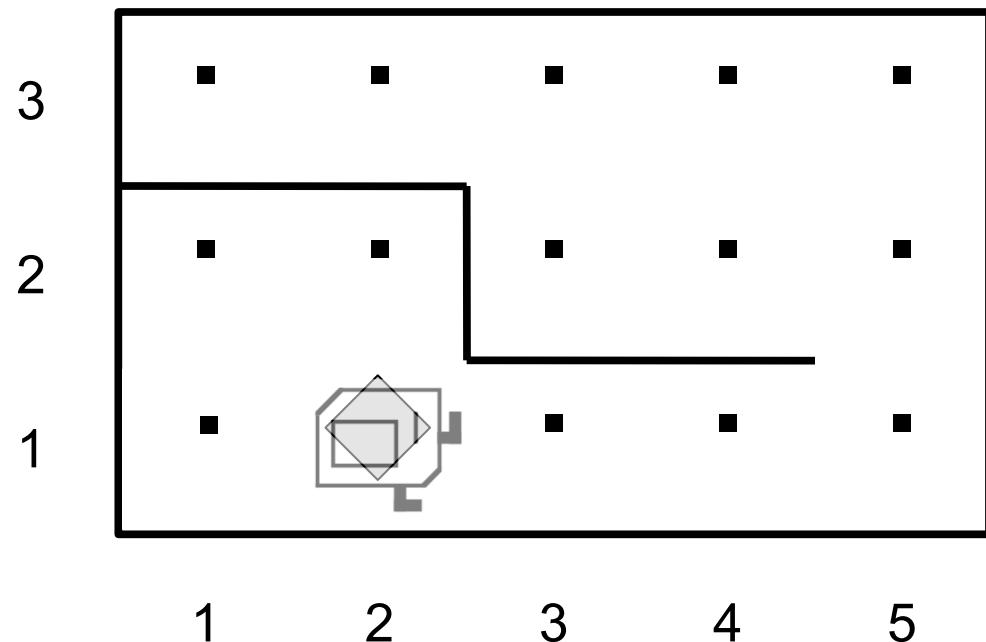


Karel Commands

move
turn_left
pick_beeper
put_beeper

- `turn_left` makes Karel rotate 90° counter-clockwise.
- There is no `turn_right` command. (Why not?)

Commands: turn_left

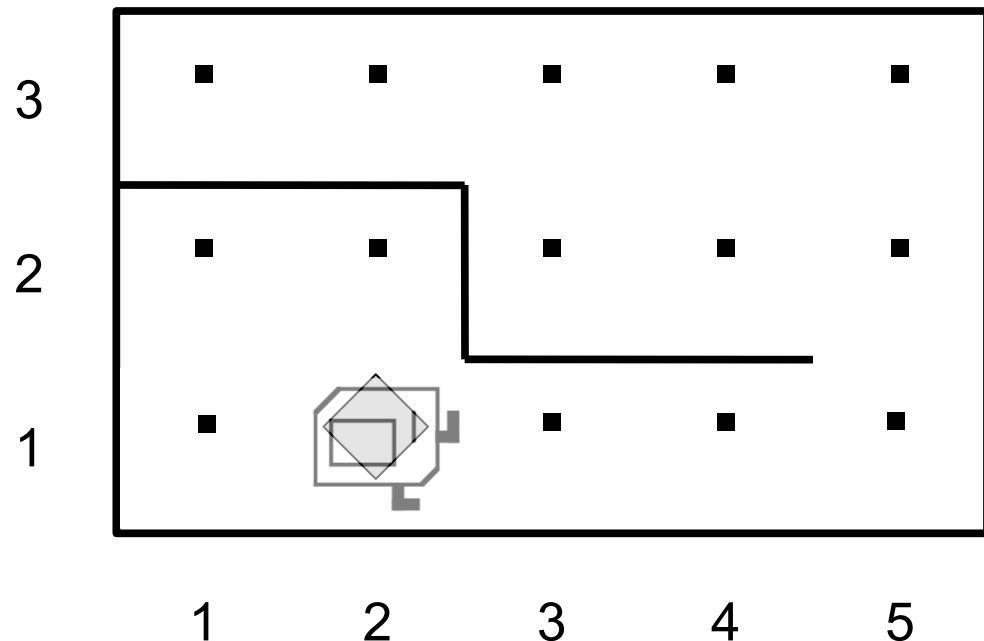


Karel Commands

move
turn_left
pick_beeper
put_beeper

- `turn_left` makes Karel rotate 90° counter-clockwise.
- There is no `turn_right` command. (Why not?)

Commands: pick_beeper

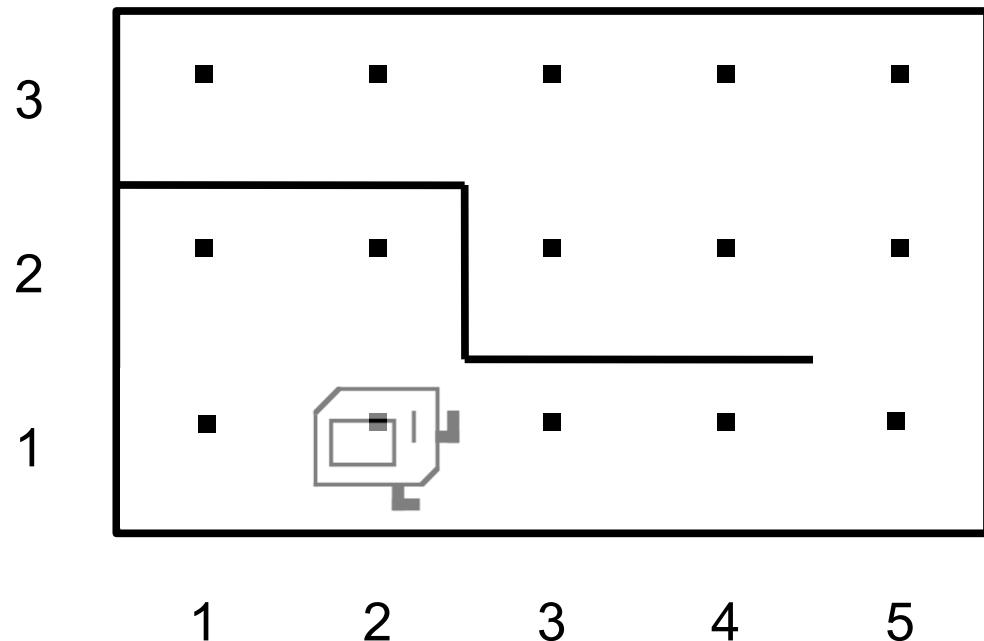


Karel Commands

move
turn_left
pick_beeper
put_beeper

`pick_beeper` makes Karel pick up the beeper at the current corner. Karel can hold multiple beepers at a time in its "beeper bag".

Commands: pick_beeper

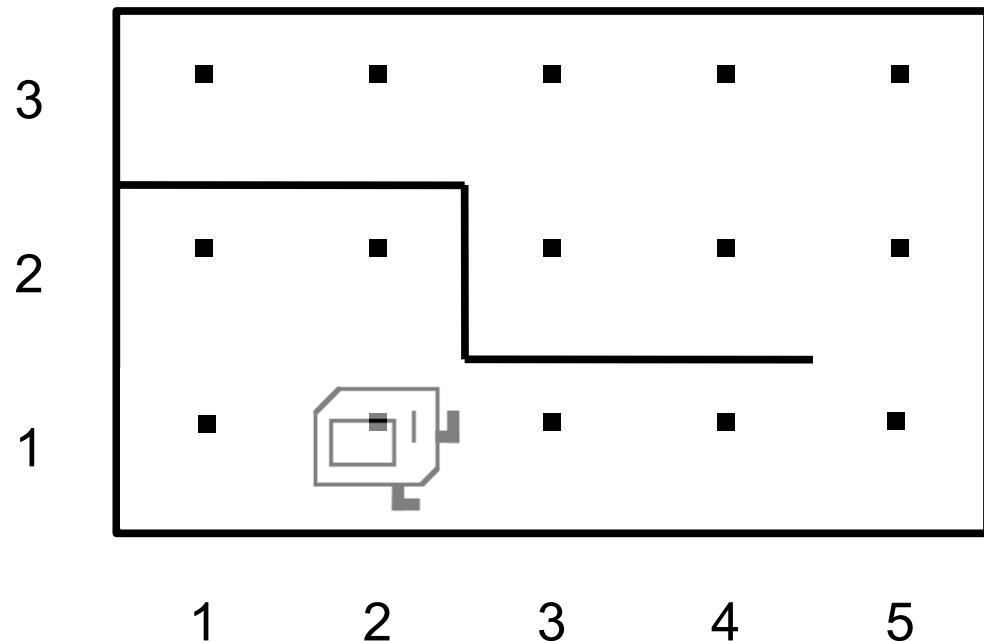


Karel Commands

move
turn_left
pick_beeper
put_beeper

`pick_beeper` makes Karel pick up the beeper at the current corner. Karel can hold multiple beepers at a time in its "beeper bag".

Commands: put_beeper



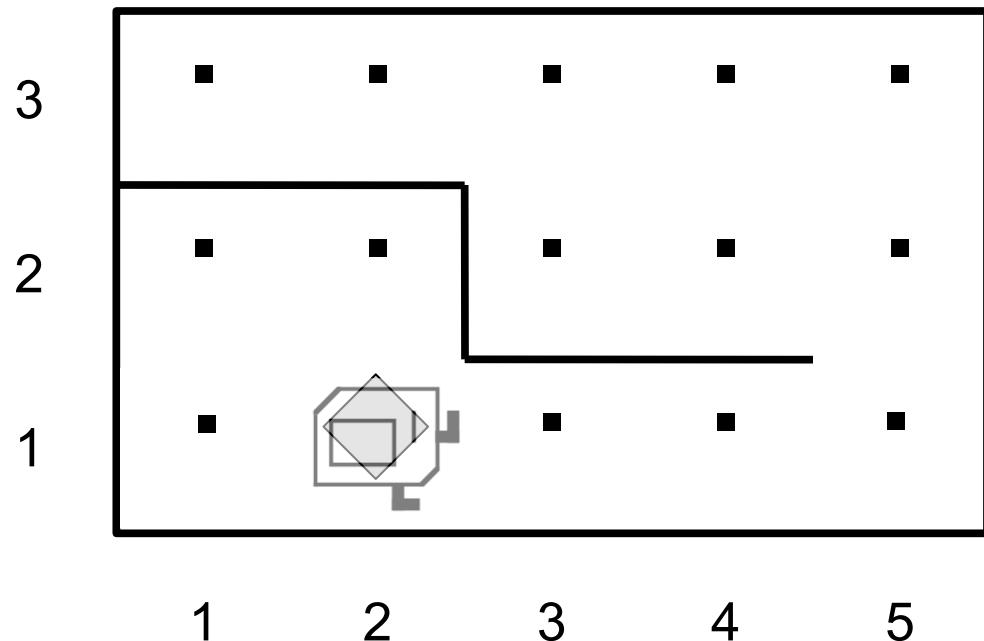
Karel Commands

move
turn_left
pick_beeper
put_beeper

`put_beeper` makes Karel put a beeper down at its current location.

- `pick_beeper` and `put_beeper` are used to move beepers around.

Commands: put_beeper



Karel Commands

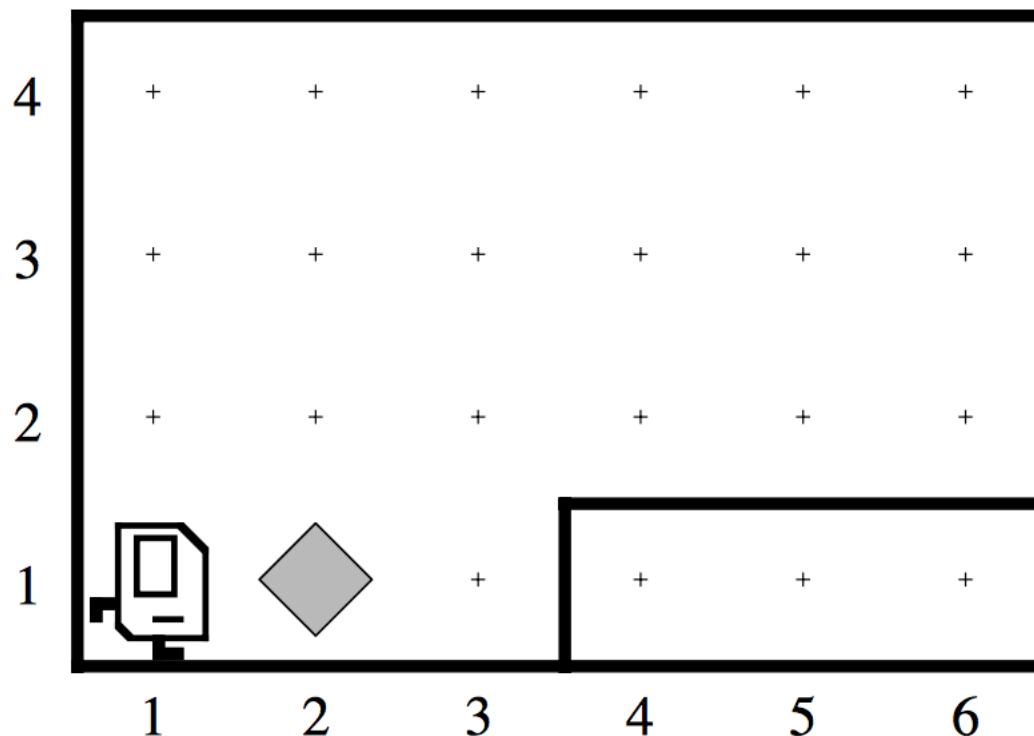
move
turn_left
pick_beeper
put_beeper

`put_beeper` makes Karel put a beeper down at its current location.

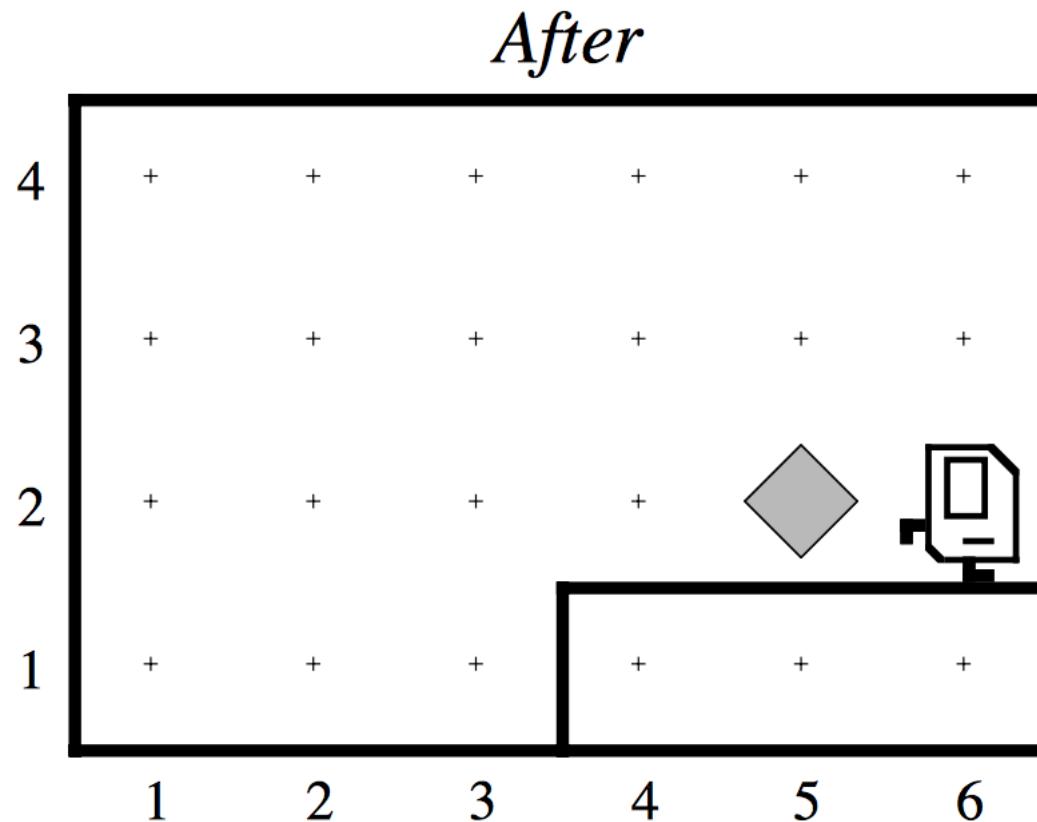
- `pick_beeper` and `put_beeper` are used to move beepers around.

Our First Karel Program

Before



Our First Karel Program



Demo

Anatomy Of A Program

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_left()
    move()
    put_beeper()
    move()
    ...
    ...
```



This piece of the program's
source code is called a
function.

```
if __name__ == "__main__":
    run_karel_program()
```

Anatomy Of A Program

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_left()
    move()
    put_beeper()
    move()
    ...
    ...
```

This line of code gives the
name of the function
(here, **main**)

```
if __name__ == "__main__":
    run_karel_program()
```

Anatomy Of A Program

```
def main():
    move()
    pick_beeper()
    move()
    turn_left()
    move()
    turn_left()
    move()
    put_beeper()
    move()
    ...
    ...
```

This is called a **code block**. Python requires that code blocks be indented one level.

```
if __name__ == "__main__":
    run_karel_program()
```

Defining New Commands

We can make new commands (or **functions**) for Karel. This lets us *decompose* our program into smaller pieces that are easier to understand.

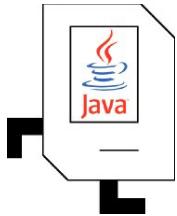
```
def name( ):  
    statement  
    statement  
    ...
```

For example:

```
def turn_right():  
    turn_left()  
    turn_left()  
    turn_left()
```

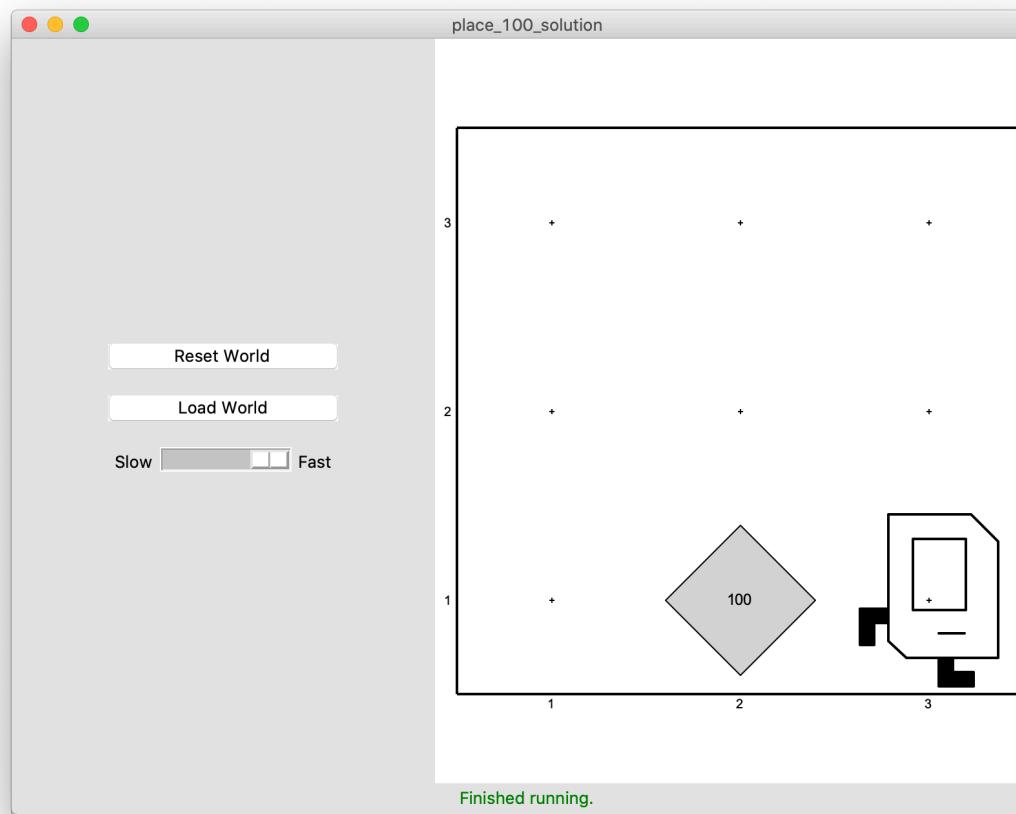
Lecture Plan

- Welcome to CS Bridge!
- Meet Karel the Robot
- **For Loops**



For Loops

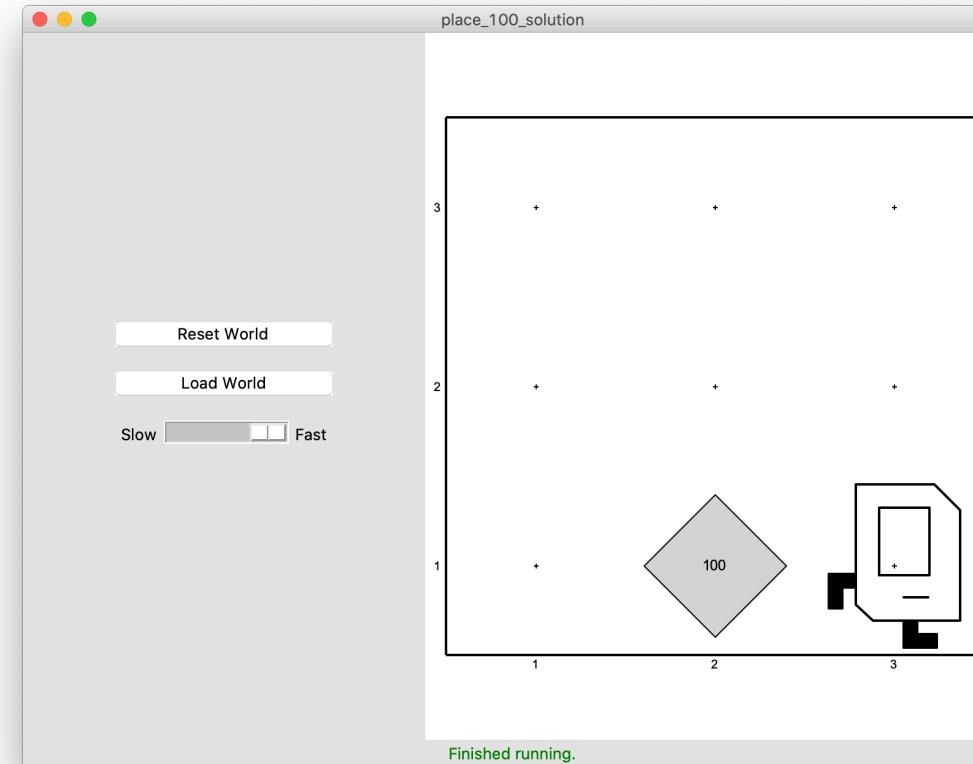
I want to make Karel put 100 beepers down on a corner. How do I do this?



For Loops

Can't just say:

```
move()  
put_beeper()  
put_beeper()  
put_beeper()  
...  
move()
```



This is too repetitive! Plus, it's difficult to change (e.g. to 25 beepers).

For Loops

Instead, use a **for** loop:

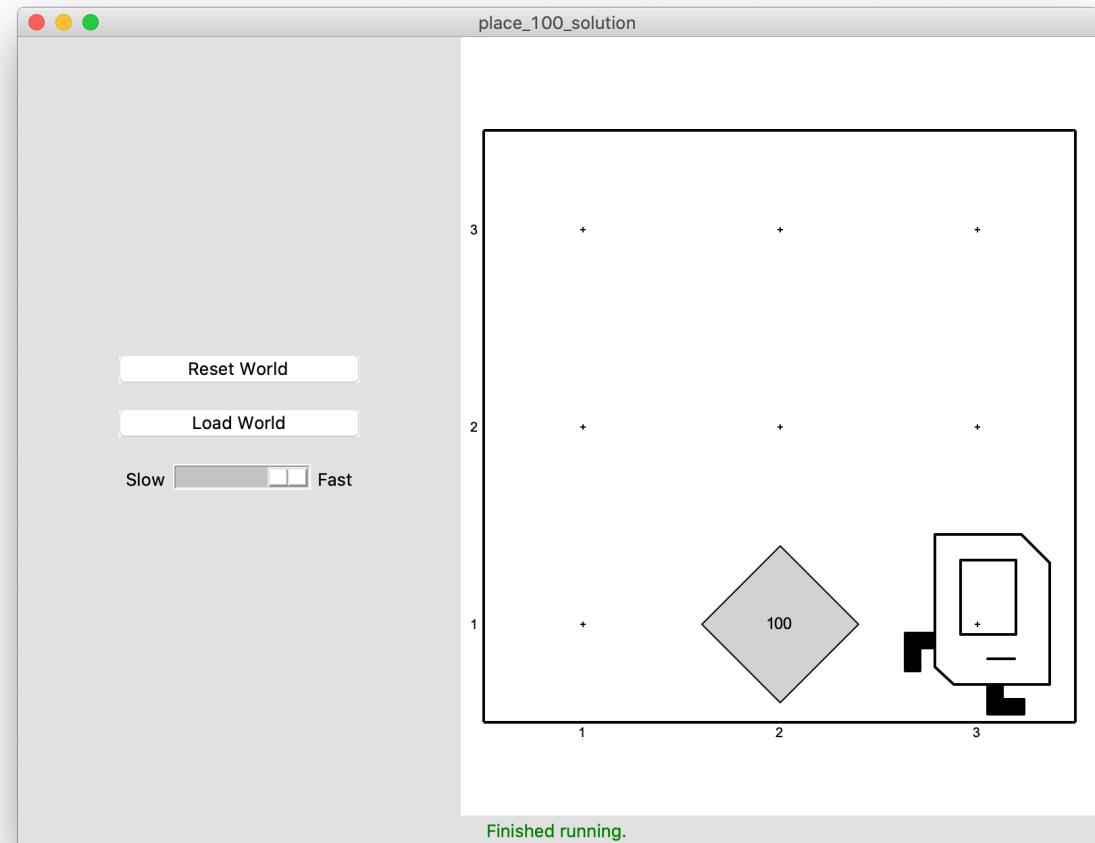
```
for i in range(count):  
    statement  
    statement  
    ...
```

Repeats the statements in the body **count** times.

For Loops

Now we can say:

```
move()
for i in range(100):
    put_beeper()
move()
```



This is less repetitive and is easier to change (e.g. to 25 beepers).

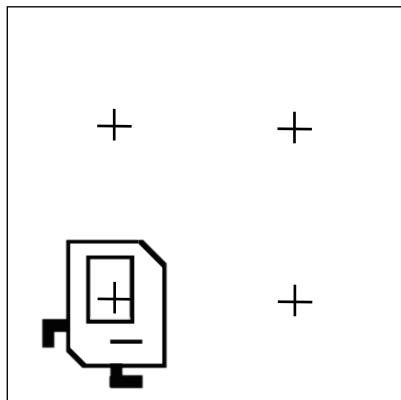
For Loops and Indentation

```
for i in range(count) :  
    statements                      # note indenting
```

```
def turn_right() :  
    for i in range(3) :  
        turn_left()      # note indenting
```

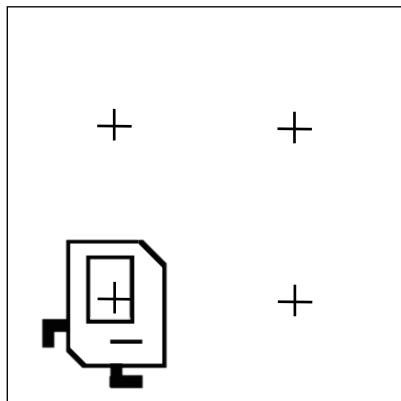
For Loop Example: Beeper Square

```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



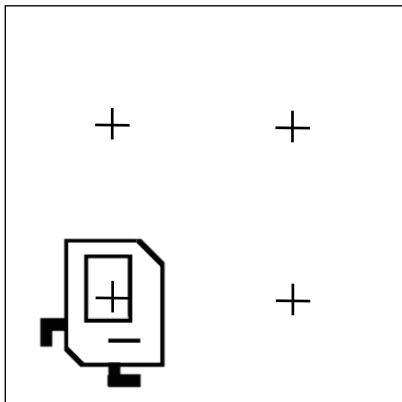
For Loop Example: Beeper Square

```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



For Loop Example: Beeper Square

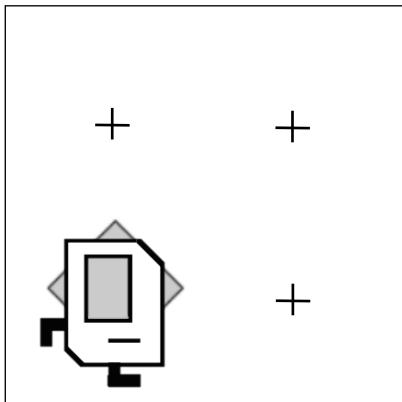
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



First time
through the
loop

For Loop Example: Beeper Square

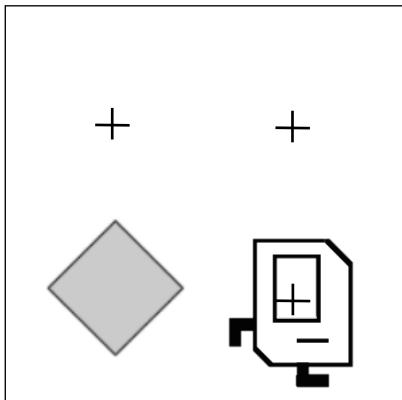
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



First time
through the
loop

For Loop Example: Beeper Square

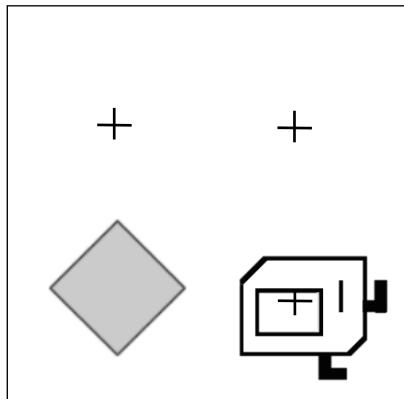
```
def main():
    for i in range(4):
        put beeper()
        move()
    turn_left()
```



First time
through the
loop

For Loop Example: Beeper Square

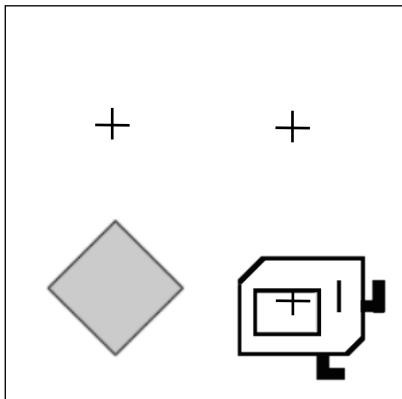
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn left()
```



First time
through the
loop

For Loop Example: Beeper Square

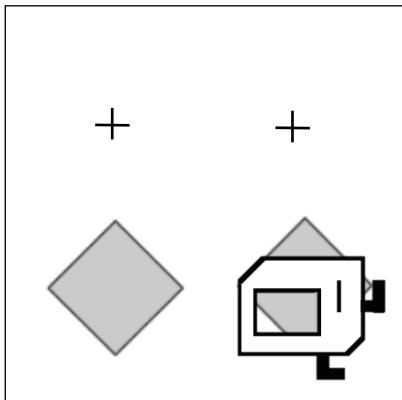
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Second time
through the
loop

For Loop Example: Beeper Square

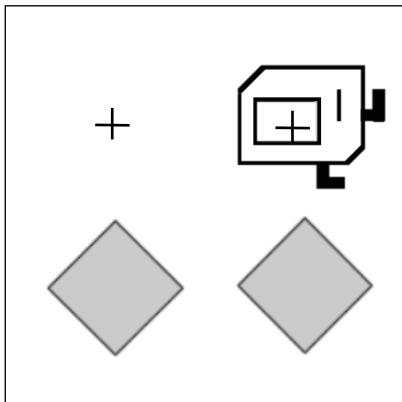
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Second time
through the
loop

For Loop Example: Beeper Square

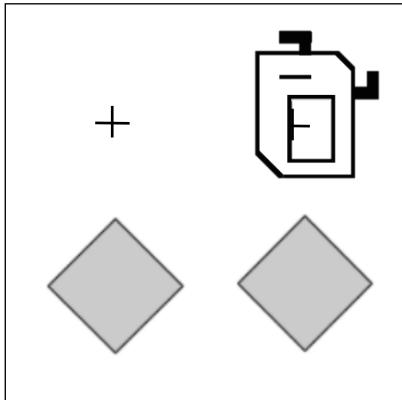
```
def main():
    for i in range(4):
        put beeper()
        move()
    turn_left()
```



Second time
through the
loop

For Loop Example: Beeper Square

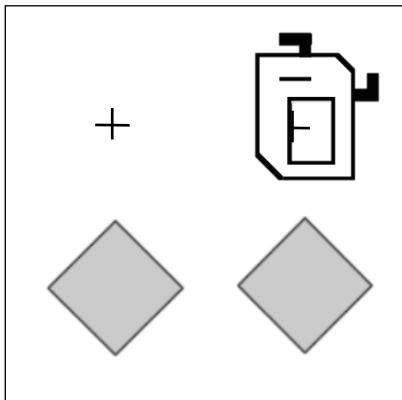
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn left()
```



Second time
through the
loop

For Loop Example: Beeper Square

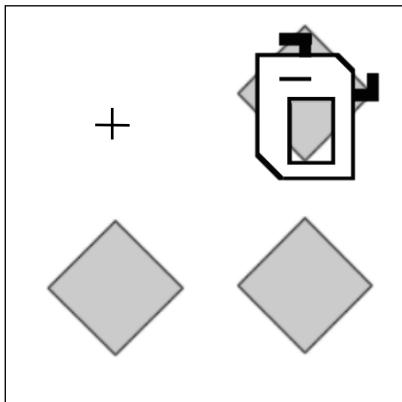
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Third time
through the
loop

For Loop Example: Beeper Square

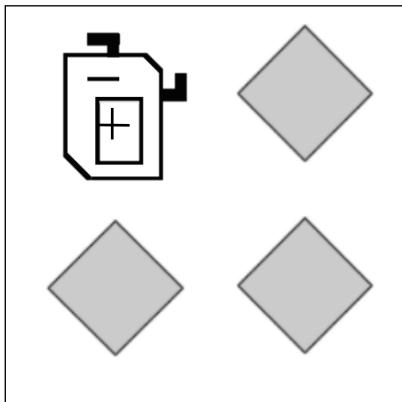
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
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Third time
through the
loop

For Loop Example: Beeper Square

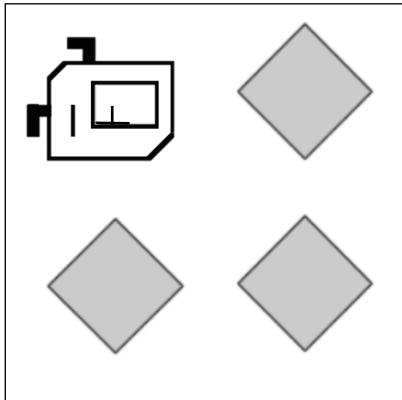
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def main():
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        move()
    turn_left()
```



Third time
through the
loop

For Loop Example: Beeper Square

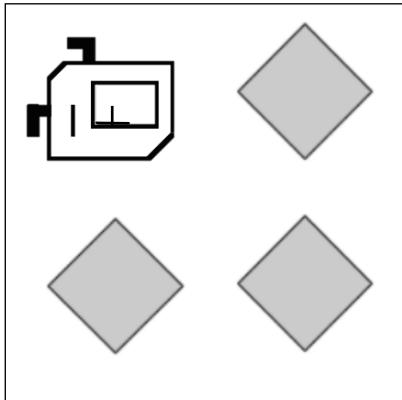
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        turn left()
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Third time
through the
loop

For Loop Example: Beeper Square

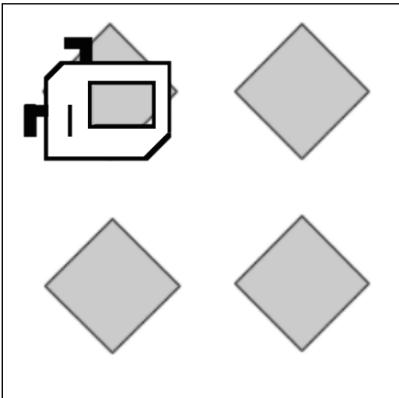
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Fourth time
through the
loop

For Loop Example: Beeper Square

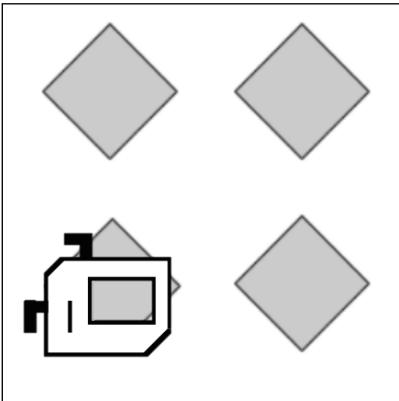
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Fourth time
through the
loop

For Loop Example: Beeper Square

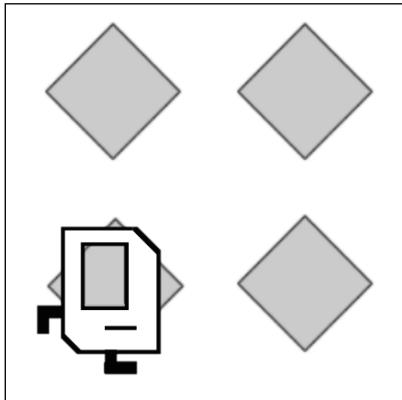
```
def main():
    for i in range(4):
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        move()
    turn_left()
```



Fourth time
through the
loop

For Loop Example: Beeper Square

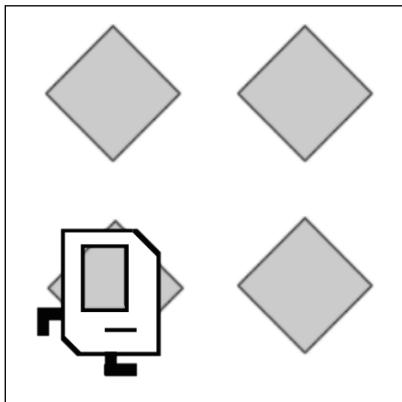
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Fourth time
through the
loop

For Loop Example: Beeper Square

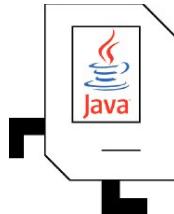
```
def main():
    for i in range(4):
        put_beeper()
        move()
        turn_left()
```



Done!

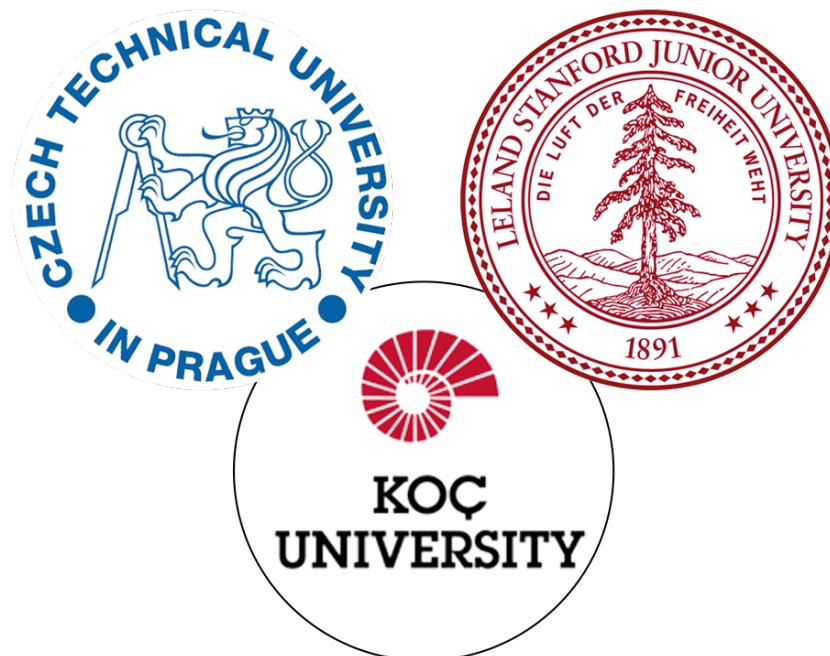
Lecture Recap

- Welcome to CS Bridge!
- Meet Karel the Robot
- For Loops



Welcome to CS Bridge!

- We are here to share with you our love for programming!
- An exciting experiment about online teaching
- A joint effort
- **Our goal:** form a community of people to learn and teach programming together



What's Next?

- Time for your section's quickstart time!
- Check your section's Ed group for more information
- We hope you will be able to get set up if you aren't already, and complete at least collect newspaper Karel. Have fun!