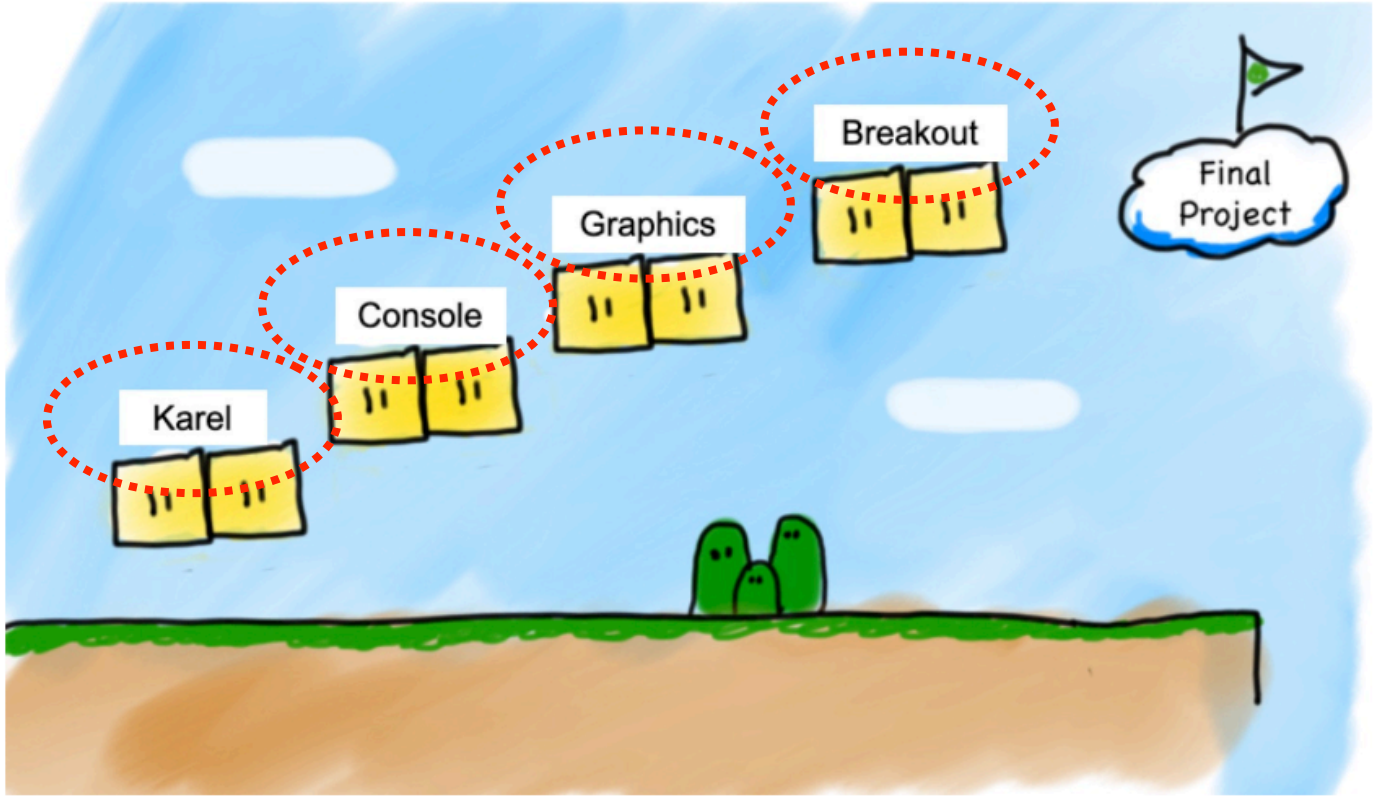
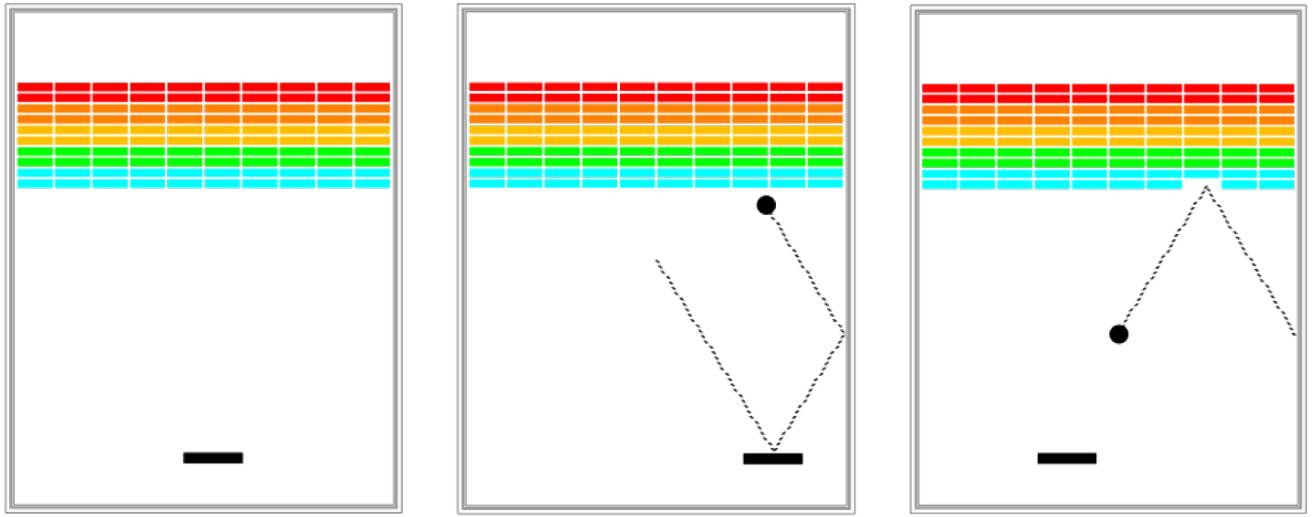
CS Bridge, Lecture 13
Breakout

KOÇ UNIVERSITY

İZMİR DEMOKRASİ ÜNİVERSİTESİ 2016

LELAND STANFORD JUNIOR UNIVERSITY 1891

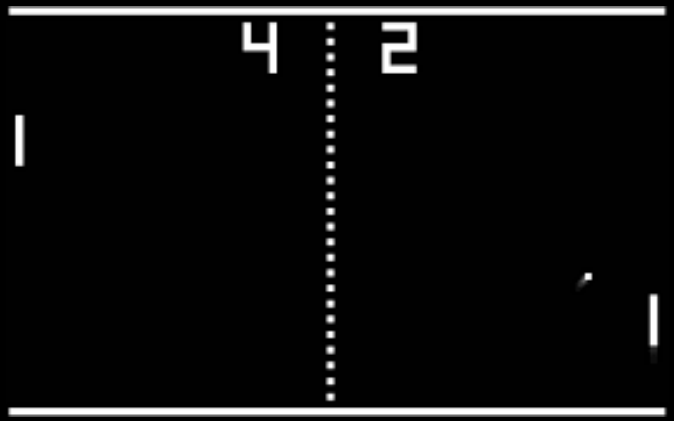

Karel
Console
Graphics
Breakout
Final
Project

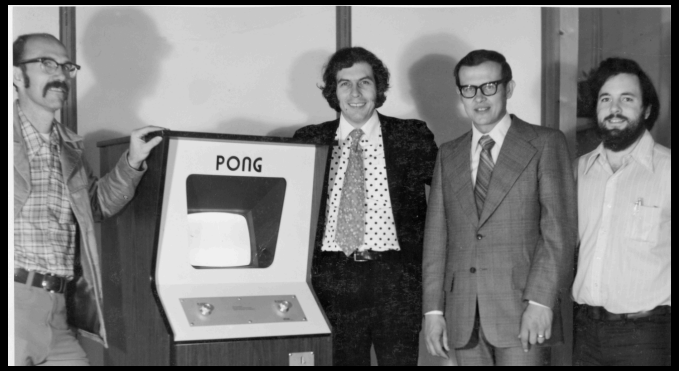


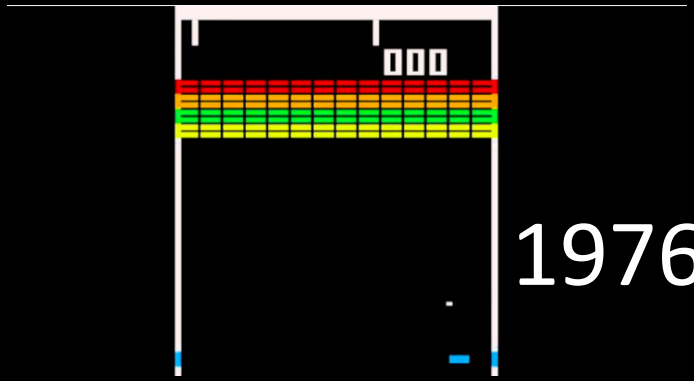
Breakout

Submission deadline: Friday morning

1972: Pong by Atari







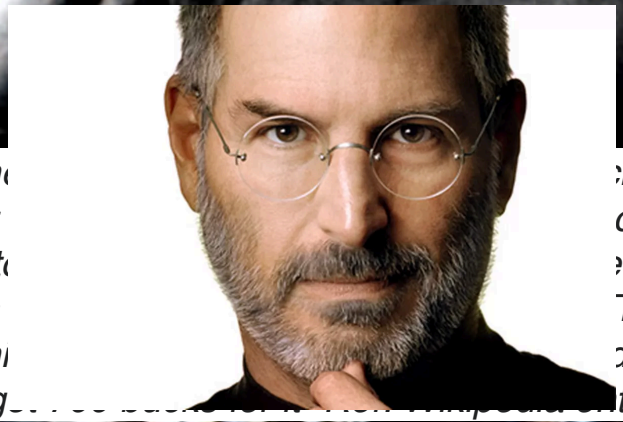
1976

Designer(s)

- Nolan Bushnell
- Steve Bristow
- Steve Wozniak

Steve Wozniak

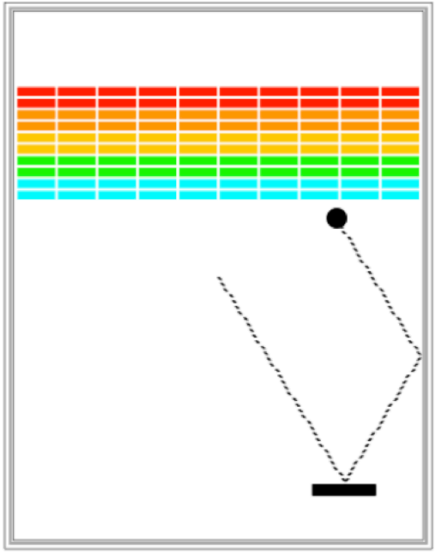
https://en.wikipedia.org/wiki/Breakout_(video_game)



Bushnell offered the … iked how n… …ships…Jobs had little specialized kno… …design but … …cing designs with a small number… … Wozniak t… …e fee evenly between them….Wo… …, and Jobs … …The original deadline was met af… …Atari four n… …designs while at his day job at Hewle… … "we only g… …try

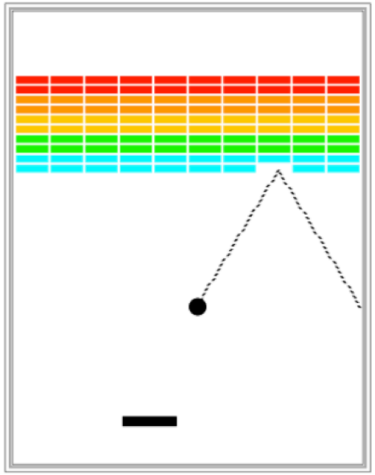
Requirements

- Goal is to break all bricks
- User has 3 turns
- Ball in the center start moving towards bottom at random angle
- Ball bounces paddle, right wall and the bricks



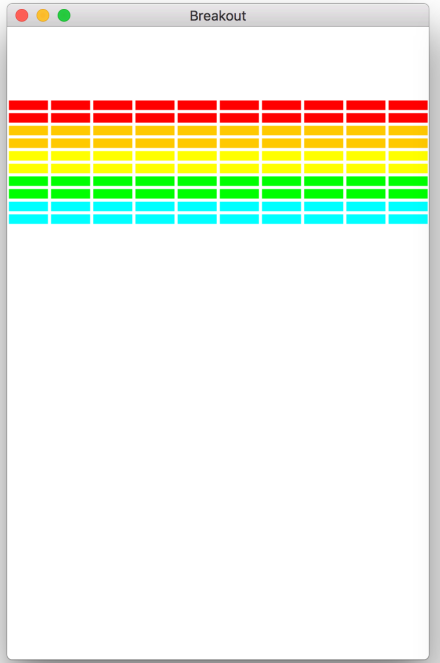
Requirements

- When hit a brick, the brick disappears
- Ball moves down either hitting left wall, paddle or bottom wall
- The turn continues until
  - The ball hits the lower wall.
    - NEXT TURN or YOU LOOSE
  - The last brick is eliminated.
    - YOU WIN

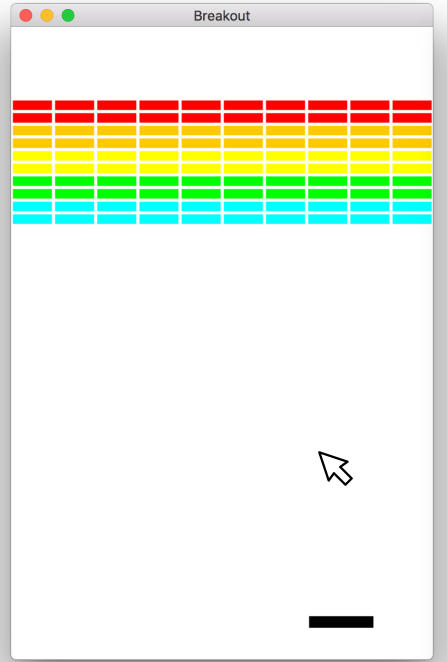


Big program. Do it in parts

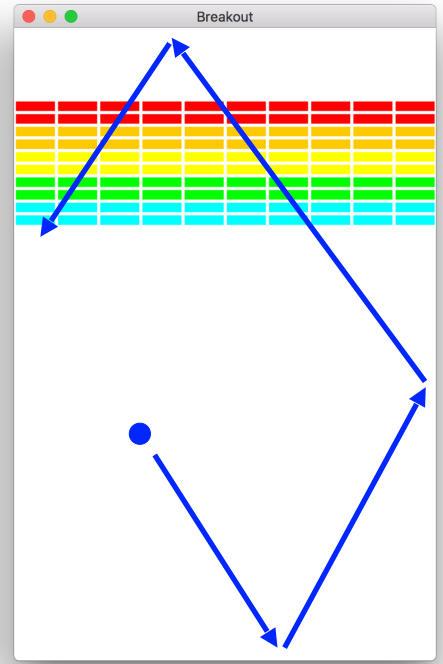
1



2



3



Some suggestions before we start

A task may include parts that look like other tasks:

Bricks in Breakout ~ Checkerboard project
Programming is not patch-work, re-think on the design
The first idea that pops-up may not be the best

This is an individual adventure:

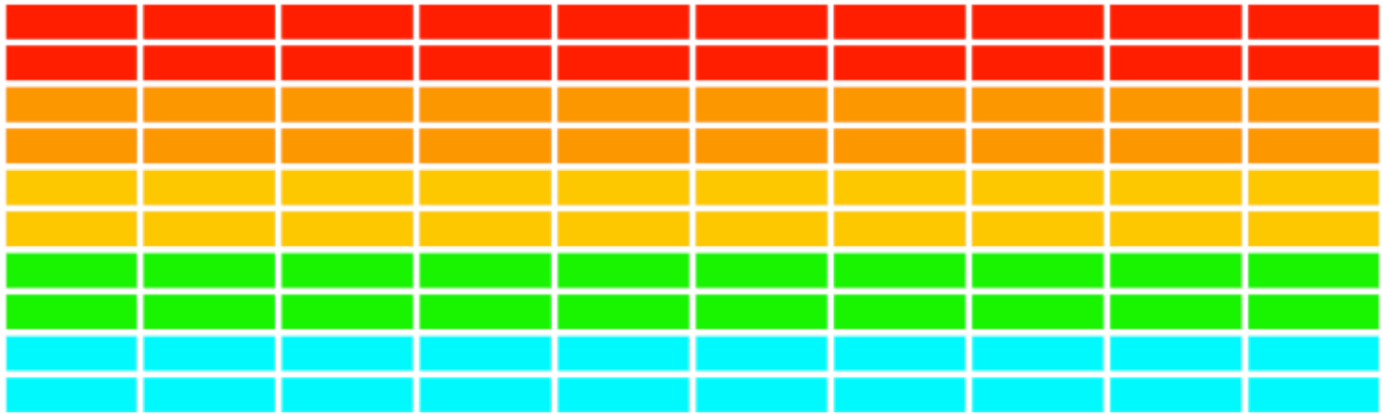
Discuss concepts, ask questions about problems you face
Do not copy-paste someone else's code

Think about decomposition, write clean code, add comments:

Design on paper, apply several steps of decomposition
Use meaningful function names
Add comments to your code

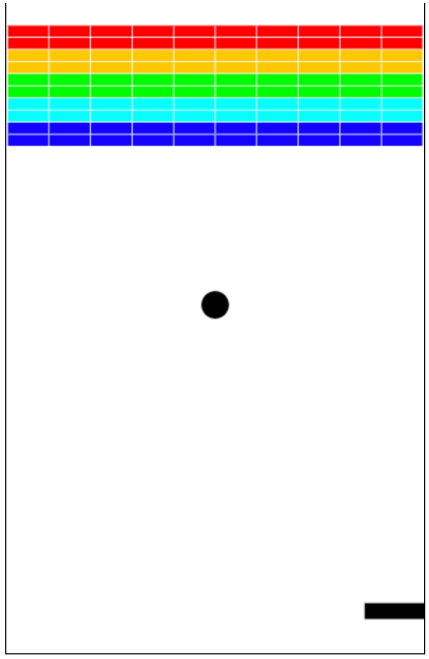
Part 1 - Creating Bricks

- Number, dimensions and spacing of bricks as constants (define them at the beginning)
- Calculate x coordinate of the first column - so that bricks are centered
- Colors of bricks - red, orange, yellow, green and cyan



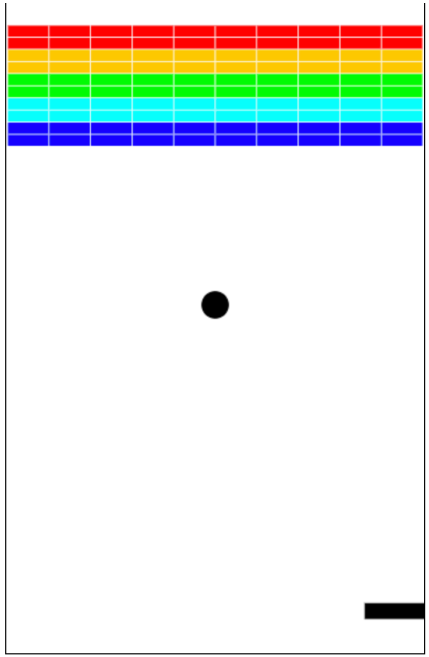
No need for lists here because we don't plan accessing and/or modifying parameters of the objects

Part 2 - Add and move ball



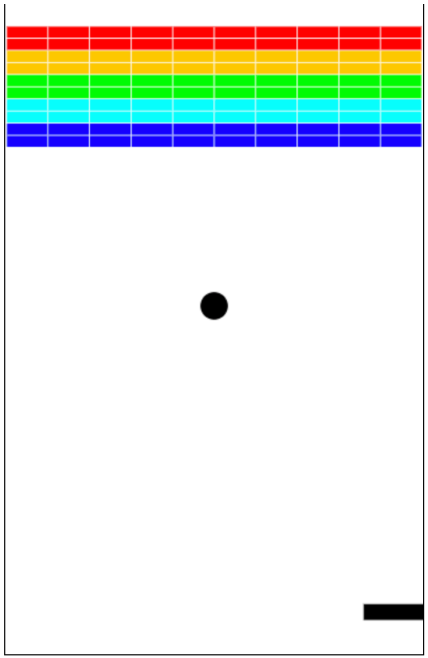
- Put filled ball at the center of the window
- Velocity of the ball - declared as variables (specify a max speed (constant))
- Pick random values for change in x and y
- Move the ball using
  - **canvas.move(object, change_x, charge_y)**
  - **canvas.moveto(object, new_x, new_y)**
- Move the ball - Initially - ball heading downwards

Part 2 - Bouncing ball



- Animation loop - where ball is moving
  - Bounce from right, left and top walls
  - Bottom wall - start in the middle again
- When bounced from top or bottom wall
  - Inverse **change_y**
- When bounced from left or right wall
  - Inverse **change_x**
- Update the canvas

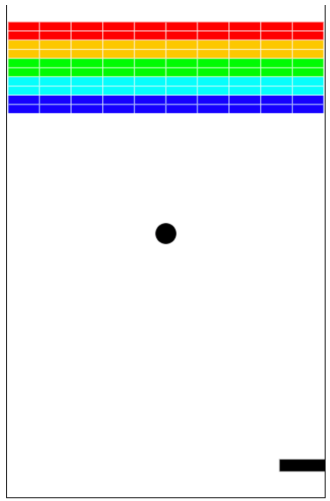
Part 3 - Add Paddle

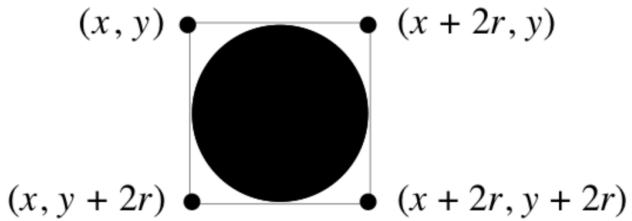


- Define some constants for the dimension and location of the paddle: width, height, y-offset from bottom
- Create Paddle - filled rectangle at a specific location
- Link paddle move with mouse move
  - Move paddle - track x coordinate of the mouse only
  - Use **mouse_x = canvas.get_mouse_x()**

Part 4 - Check for collision

- Did ball collide with another object in the window
- **canvas.find_overallapping** (x1, y1, x2, y2) which return list of objects overalling with rectangle whose upper left is (x1, y1) and bottom right is (x2, y2)





colliding_list = canvas.find_overlapping(……..)
for loop to get a collider object in each loop:
…. do something with collider object

Think about writing a *check_collision* function that implements all listed above

Part 4 - Check for collision

- Use of list

```
# this graphics function gets the location of the ball as a list

ball_coords = canvas.coords(ball)

# the list has four elements:

x_1 = ball_coords[0]

y_1 = ball_coords[1]

x_2 = ball_coords[2]

y_2 = ball_coords[3]



# we can then get a list of all objects in that area

colliding_list = canvas.find_overlapping(x_1, y_1, x_2, y_2)
```

Part 4 - Check for collision

- Collide with a paddle
  - Bounce ball towards up
- Collide with a brick
  - Bounce ball towards down
  - Remove brick from the screen

```
canvas.delete(square)  # deletes the object called square
```

  - Count the number of removed bricks
    - That’s how you know you hit the last brick


You can do it!