PAC-MAN PROJECT

DEFENSE

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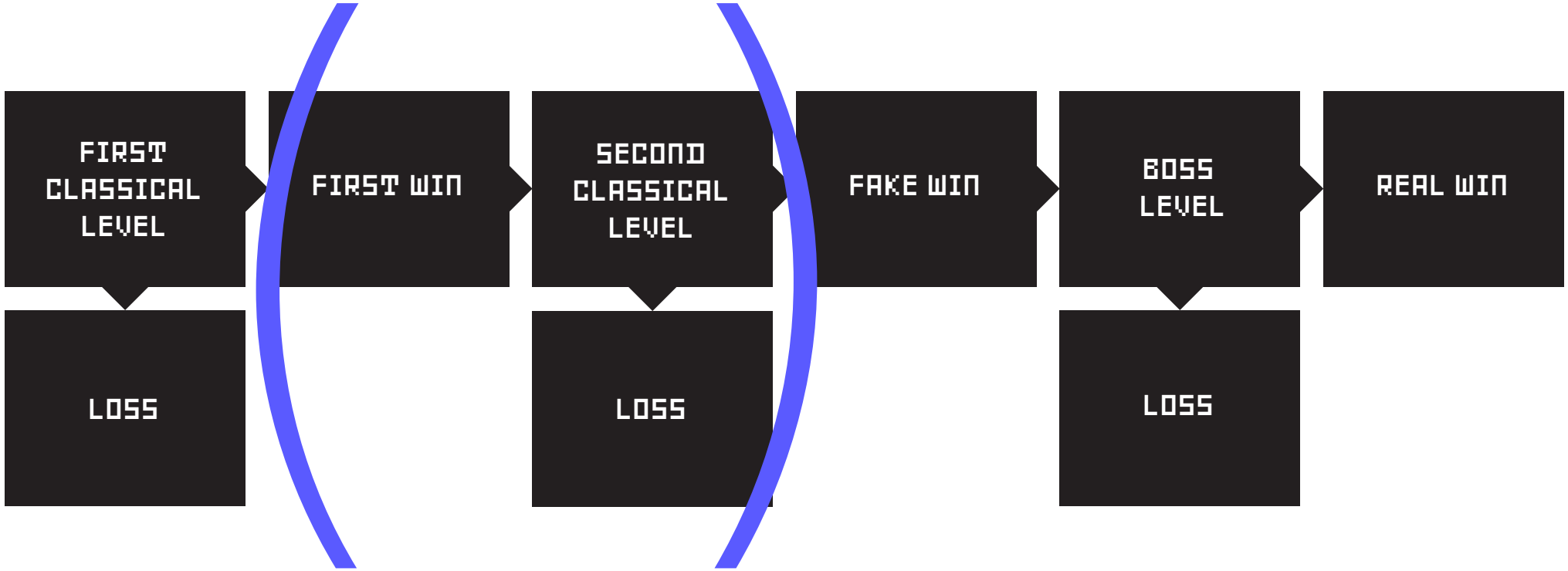
FLOW OF THE GAME



CODE STRUCTURE

MVC pattern and object oriented not ECS system
because too complicated and not too many entities

► For a classic stage

- Entities (Pac-Man and ghosts)
- Stage containing Squares

► For the boss level

- One base “Entity” class (move() and render()) + heirs

PROGRAM FLOW

Same flow for every level:

- Call objects **constructors**
- **while (!quit)**
  - **move** entities
  - **collide** entities
  - **render** stage

Separate steps ► we can act on each of them independently

MOVING IN THE MAZE

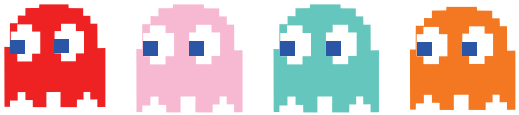
► **Staying in the maze**

Matrix of squares ► an entity moves between two squares' centers and the path is recalculated once on a new center

► **Moving the right way**

Path calculated through **pathfinding** function (function pointer easily changed depending on the entity and its state)

MOVING IN THE MAZE



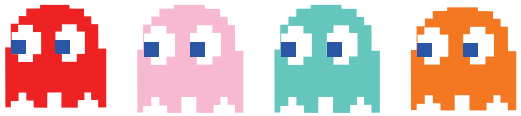
► **Pros:**

- wall detection is easy,
- entity collision detection is fast,
- pathfinding is pretty fast.

► **Cons:**

- collision might fail,
- a teleporter is much harder to code,
- movements can only be vertical or horizontal.

MOVING WITH THE BOSS ...



► **All objects:**

"Classic" entities with variable position and speed vectors.
Every frame: position += time_delta*speed.

► **Pros:**

- more intuitive,
- complex movement are easier (rotation while translating).

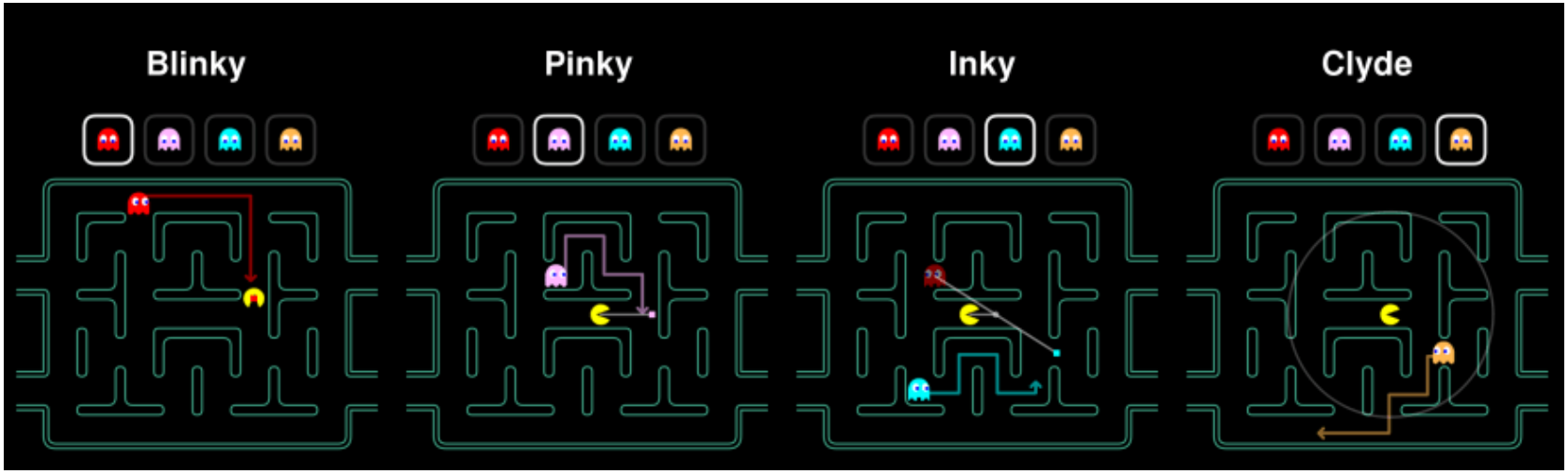
► **Cons:**

- AABB collision detection (a bit harder to code),
- bugs sometimes when encountering wall.

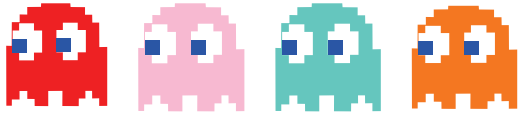
PATH FINDING IN THE MAZE

► **For ghosts:**

Same as in the original Namco game,
Among **available squares**, choose the one closest to a specific **target square**.



PATH FINDING IN THE MAZE



► **For dead ghosts:**

- **BFS** (concurrent **Dijkstra**) to spawn,
- A* unnecessary (small grid ≠ graph and labyrinth).

► **For Pac-Man:**

- If no intersection, then go straight;
- If intersection, then go in direction of last key input;
- If trying to go through a wall, then stop.

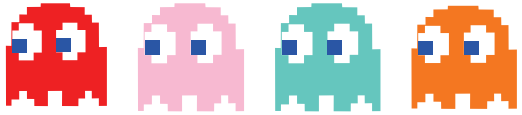
PATH FINDING IN THE BOSS STAGE

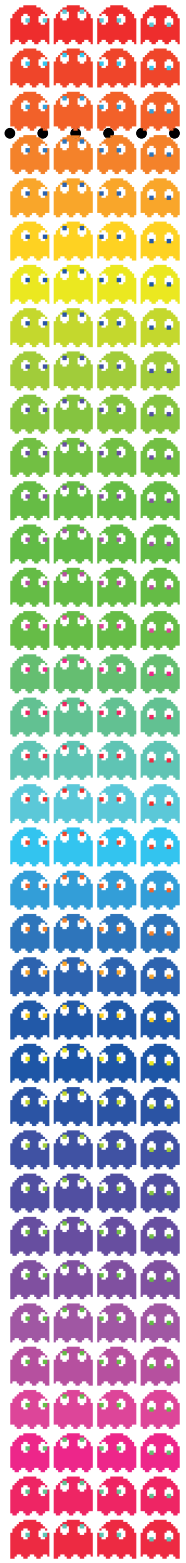
► **Most objects:**

Find **vector** from position to target point, **normalize** it, multiply by the entity's **speed**.

- boss does it only when rumbling;
- pong ball once, at spawn, then only makes -1*speed(x/y) when wall or racket encountered;
- pong racket targets same x as it has and y of the ball, then goes back to mid-height;
- bullets spawn in a circle around the boss and target the boss spawn position;

GRAPHICS AND ANIMATION

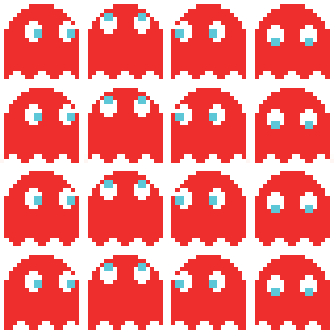


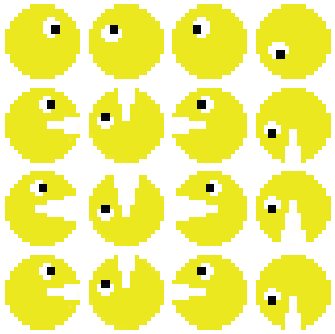


► **For entities:**

- Use of **sprites**,
- Horizontal is direction, vertical is time,
- Easy to rotate, flip, change directions,
- Rather simple to create new sprites (mostly 20*20 px).

► Much better than geometrical rendering

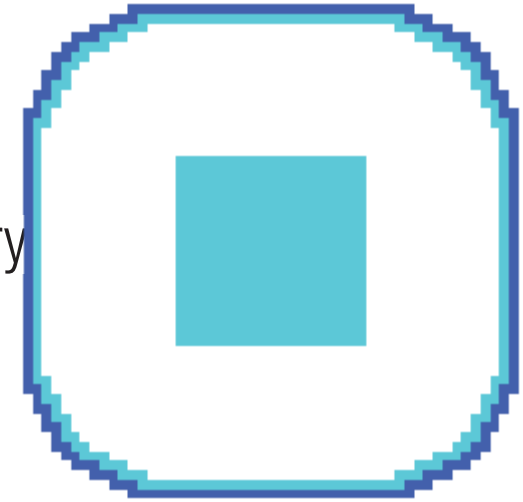




YOU WON

... ?

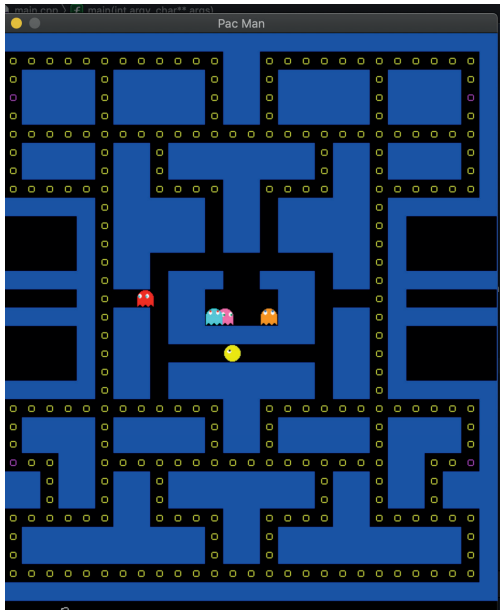
GRAPHICS AND ANIMATION

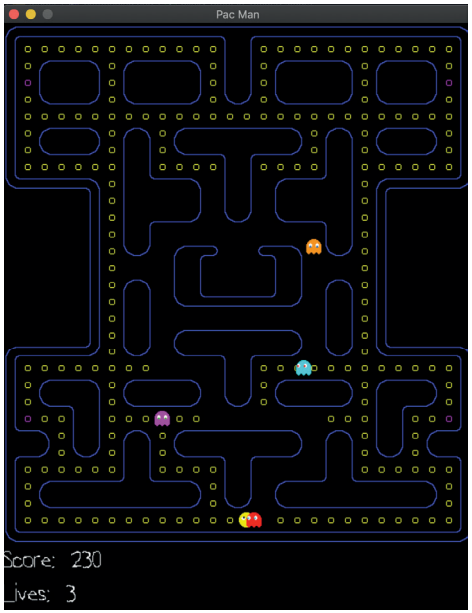


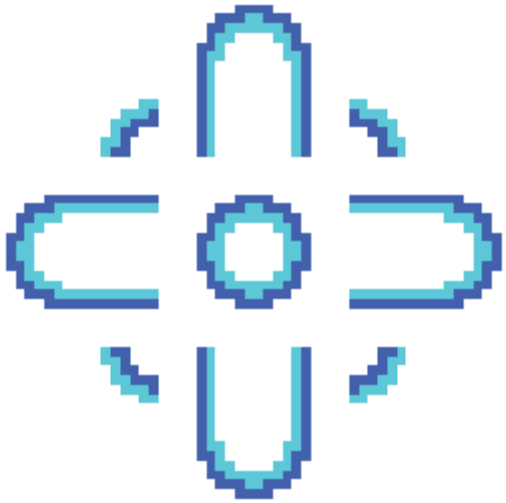
► **For the walls**

- A **generalized method** that would work with any layout,
- >> Several bits of wall pasted one over the other with a binary function to select what shape

► Much better than geometrical rendering







REMARKS

► **SDL Wrapping:**

SDL is a pretty tough library to learn how to use properly so we relied on a few «wrapped» programs found on some tutorials :

- **LTexture** loads a picture and renders it at a given point on the screen.
- **LTimer** is a timer...
- **FPSCapper** restricts FPS (because VSync isn't enabled on all devices). Otherwise on Mac, it would run at 1200 fps.

► **An unforeseen difficulty:**

It turns out that it's actually much **harder to distibute** our game than if it was made with Python Scripts for instance.