CPSC 359 – Tutorial #8
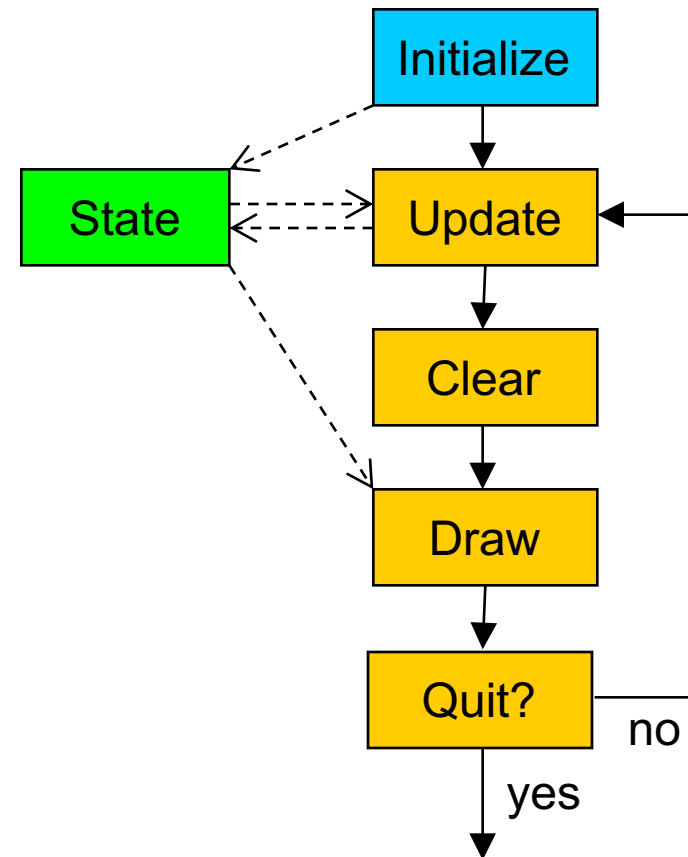## Animation & Drawing ASCII Text

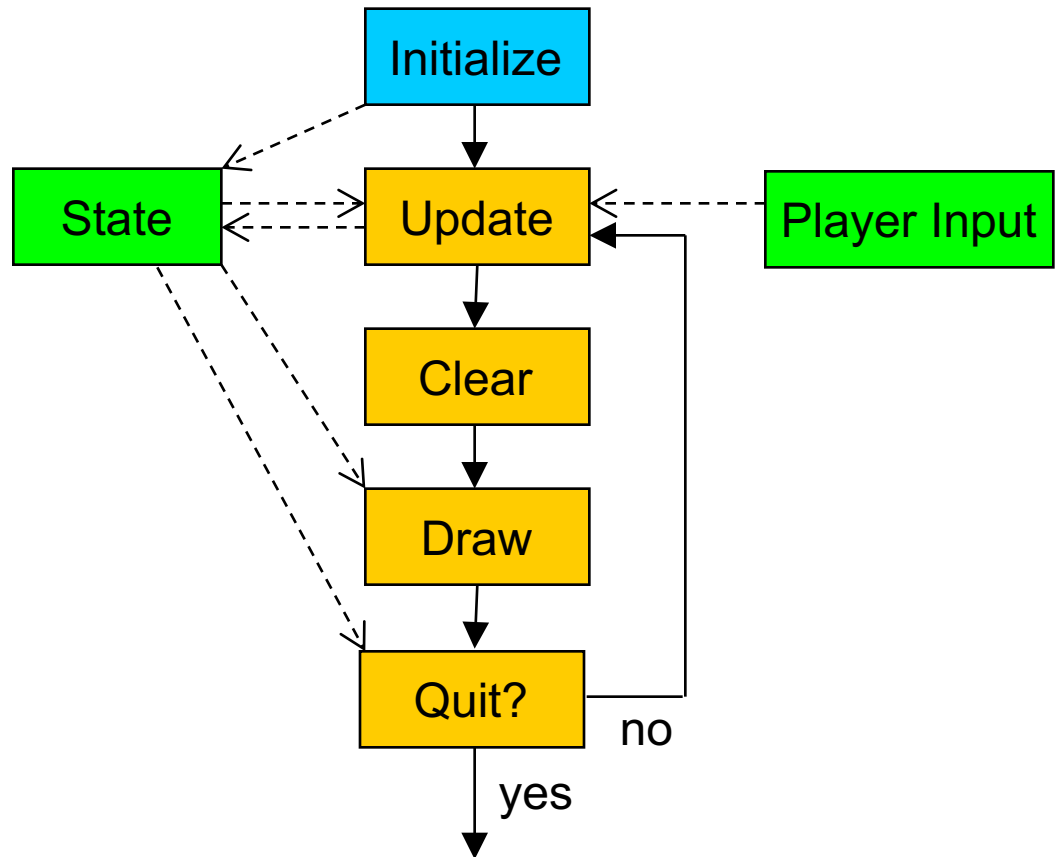Andrew Kuipers

Components of Animation

- The State Data Structure
  - Position of moving objects
  - Velocities / Accelerations

- The Update Function
  - Update the State Structure
  - Change positions / vel / accel
  - Check conditions (eg: collisions)

- The Draw Function
  - Draw the State Structure

A Game Loop

- **Get Player Input**
  - Update State

- **Game vars in State**
  - Score
  - Level
  - Win / Lose

- **Quit based on Input**
  - Store in State

```
        Initialize
            │
State ◄╌╌╌╌ Update ◄╌╌╌ Player Input
      ╌╌╌►    │
            Clear
              │
            Draw
              │
            Quit? ── no
              │ yes
              ▼
```

Font Maps

- Define "bitmaps" for characters
  - One bit per pixel
  - Character has width / height
  - ie: 8x16 = 8 cols, 16 rows
    = 16 bytes per char

- ASCII value gives offset
  - base + (ASCII(char) * 16)
  - eg: ASCII('B') = 66
  - 66 * 16 = 1056 = 0x420

Offset	Value	7	6	5	4	3	2	1	0
0x420	00	0	0	0	0	0	0	0	0
0x421	00	0	0	0	0	0	0	0	0
0x422	00	0	0	0	0	0	0	0	0
0x423	7E	0	1	1	1	1	1	1	0
0x424	82	1	0	0	0	0	0	1	0
0x425	82	1	0	0	0	0	0	1	0
0x426	82	1	0	0	0	0	0	1	0
0x427	7E	0	1	1	1	1	1	1	0
0x428	82	1	0	0	0	0	0	1	0
0x429	82	1	0	0	0	0	0	1	0
0x42A	82	1	0	0	0	0	0	1	0
0x42B	7E	0	1	1	1	1	1	1	0
0x42C	00	0	0	0	0	0	0	0	0
0x42D	00	0	0	0	0	0	0	0	0
0x42E	00	0	0	0	0	0	0	0	0
0x42F	00	0	0	0	0	0	0	0	0

Adding the Font Data

- Download "font.bin" from D2L
  - Save it in the source/ directory for your project

- Add the following to the `.data` section:

```
.align 4
font: .incbin "font.bin"
```

- The label `font` will be used as the base address of the font map