

DATA STRUCTURES

in GAME DEV



MINESWEEPER

ARRAYS

MECHANICS

- Board
- Populate mines and Cells
- Count Neighbouring Mines
- Open Neighbouring Cells

LEARN

- Board
- Populate mines and Cells
- Count Neighbouring Mines
- Open Neighbouring Cells

LINKED LISTS

MECHANICS

- Create Snake
- Eat Food
- Eat Poison
- Collision

LEARN

- Doubly Linked List
- Insert Nodes
- Delete Nodes
- Node Search



SNAKE

STACKS



Spider Solitaire

MECHANICS

- Card Columns
- Place Card
- Remove Card
- Check Top Card
- Undo Move

LEARN

- Stack Array
- Push Operation
- Pop Operation
- Peek Operation
- History Stack

HOW GAME DEVS SEE

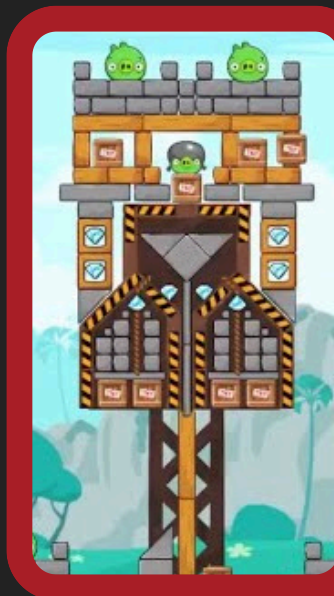


PROGRAMMING PATTERNS GUIDE



Bird Building **FACTORY**

- Factory creates bird types
- Clones from base prototypes
- Each with unique abilities



Level Spawning

OBJECT POOLING

- Pre-instantiates
 - Obstacles
 - debris particles
- Reuses destroyed block pieces
- Manages explosion effects



Bird States

STATE MACHINE

- Ready → Pulled → Flying → Special Ability
- Each state has specific behaviors

Destruction Meter UI

OBSERVER



- Updates score on destruction
- Notifies achievement system



Game Management

SINGLETON

- Global Level Manager
- Audio Controller



Analytics and Ads

SERVICE LOCATOR

- Centralized access to Analytics and Ads Service
- Avoid multiple Singletons
- 1 Place for all Services



HOW GAME DEVS SEE



PROGRAMMING PATTERNS GUIDE



AI STATE MACHINE

Behaviour runs on States like

- Attack,
- Die,
- Run



Troop-Projectile Spawning

OBJECT POOLING

- Reuse and pool entities
- Don't frequently
 - instantiate
 - destroy



UI Systems

MVC

Structures complex systems into

- Data
- Presentation
- User Interaction



Game, Audio and Network Manager

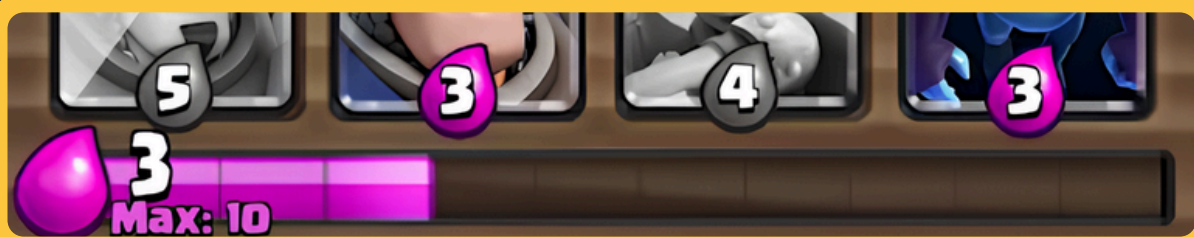
SINGLETON

Managers have a

- Single
- Globally accessible instance

Health and Elixir UI Updates

OBSERVER



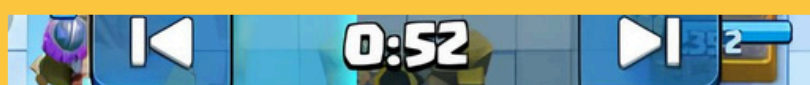
Updates the Health and Elixir UI only when their values change and not every frame.

Replay System

COMMAND

In Match for every player action

- Record
- Convert into an object
- Reuse to reconstruct the Gameplay Session



Analytics and Ads

SERVICE LOCATOR

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HOW GAME DEVS SEE



Character Creation System

FACTORY

- Base character template
- Each type extends template
- No code changes for new types



Game & Audio Manager

SINGLETON

- Only 1 instance of each Manager Class in game
- Accessible anywhere in the game

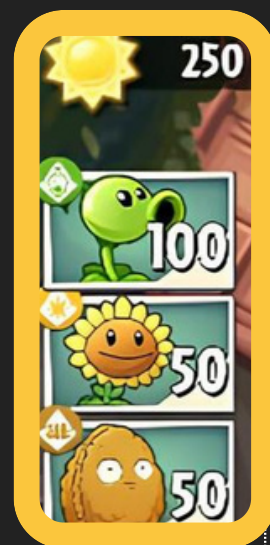


AI

STATE MACHINE

Character behaviour is based on states like:

- Searching for brains
- Eating plants
- Dancing victory



Game's

Event Handling

OBSERVER

- Events notify listeners
- Decoupled components
- Subscribe/unsubscribe dynamically

Mass Spawning

OBJECT POOLING



- Pre-instantiate object collection
- Deactivate instead of destroy
- Reuse from pool when needed



DATA STRUCTURES in GAME DEV



Resident Evil 4

ARRAYS / VECTORS

- Tile-based Maps
- Textures
- Particle system positions and other properties
- Grid-based Inventory Systems
- Object pools for projectiles and effects

HASHMAPS

- Game Save Data Serialization
- Resource Management
- Fast Lookup for Game Objects



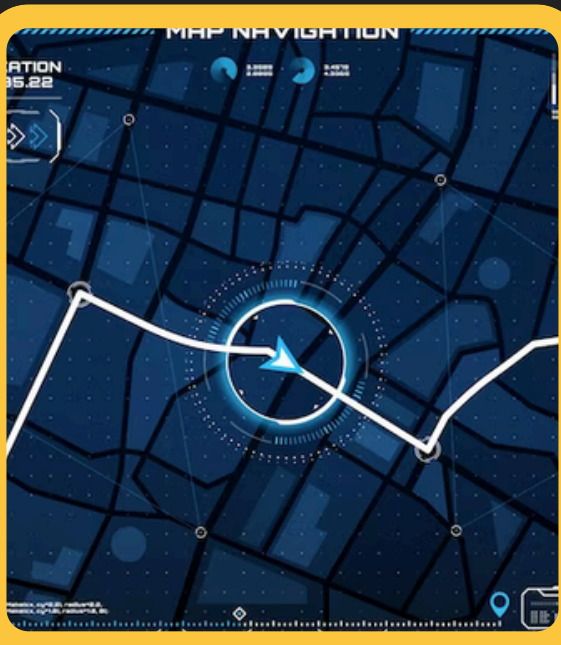
Tekken 7

STACKS & QUEUES

- Undo/redo System
- Replay systems
- Input buffering in Fighting Games

TREES

- Dialogue Trees
- Behavior Trees for AI Decision Making
- Skill Trees for Progression Systems



GRAPHS

- Navigation Meshes for pathfinding
- Quest Dependency Networks
- State machines for Character Behavior



God of War