CE810 - Game Design 2

Lab - Game Design Hack

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University of Essex

Intro

CE810 game engine

- Remember we mentioned that we built you a game engine...

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- well, here it is.

Limitations

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- Games are turn-based

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We originally designed it for Civilization style games, but it's much more general than that.

Comparison

A number of you have **encountered** the GVGAI Framework.

GVGAI Framework

Our System

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Custom VGDL files

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Json standard based files

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No ability to extend features	Ability to extend features

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Slows down with additional rules	No such speed issues

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Custom VGDL files	Json standard based files
No ability to extend features	Ability to extend features
Slows down with additional rules	No such speed issues
Focuses on Interactions	Focuses on Rules

Game Engine

Key Parts

- A game has Entity Types, Resources, and Terrain

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- Entity types have actions, costs and properties
- Resources and Terrain make up the maps
- Victory conditions tell you how to win (or lose)

Entity Types

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- Entity Types can **extend** other types
- Defines:
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  - Properties

Example: EntityType

```
{
"name": "abstract_civilian",
"properties": {
    "movement": 1,
    "health": 5,
    "attackRange": 1,
    "atkMelee": 1,
    "ter-grass": 1
},
"cost": {
"food": 10
},
```

Example: EntityType

```
"_actions": [
    "Move",
    "MeleeAttackAction",
    "Build[farm]",
    "BuildOnResource[lumber_mill:wood]",
    "BuildOnResource[gold_mine:gold]",
    "Build[marketplace]"
]
},
```

Entities

- Have an Entity Type

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- Have properties

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- Have properties
- Can perform 1 Action per turn

Actions

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What an Entity can do

- 0 or more

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- Parameterisable

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What an Entity can do

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- Inherited

Orders

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An order is **generated** when an Action is used on a **particular** location

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- What an Entity **actually** does in its turn
- Used to **update** the game state
- Move Action $\rightarrow$ **multiple** possible Move Orders

Properties

- String $\rightarrow$ Integer mapping

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- Used by default actions as well as custom ones

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Terrain

Terrain defines the ground in the games

id	The name of this terrain type
image	The graphics path for drawing
requiredTags	Mapping of String $\rightarrow$ Integer.

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  - AI

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  - It will be detected on the classpath
  - Use the same way as the built in items
- You can add **new**:
  - Actions
  - Orders
  - AI
  - Victory Conditions

Examples

Medieval TBS

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- Fairly conventional

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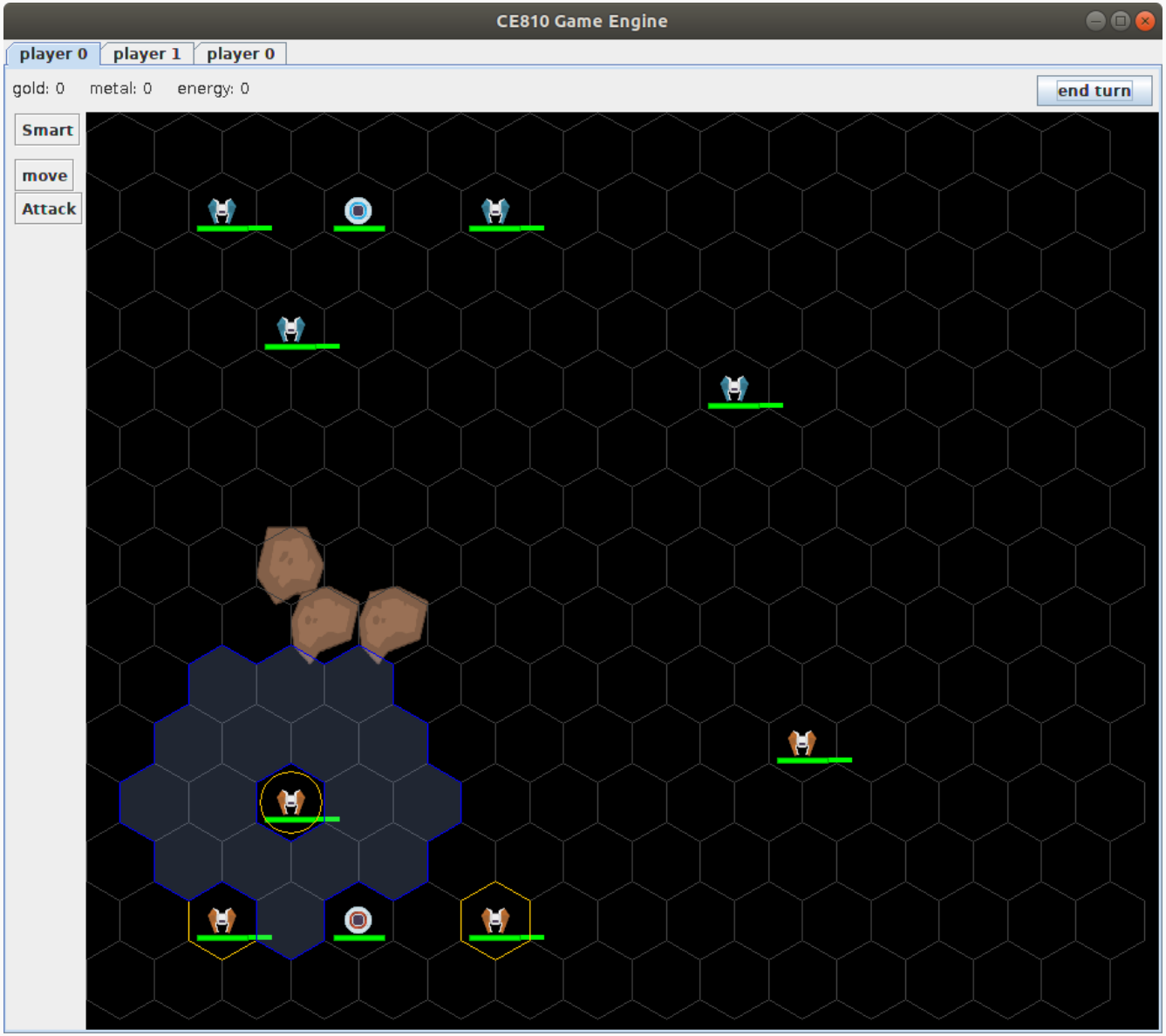
- Build on resources for turnly income

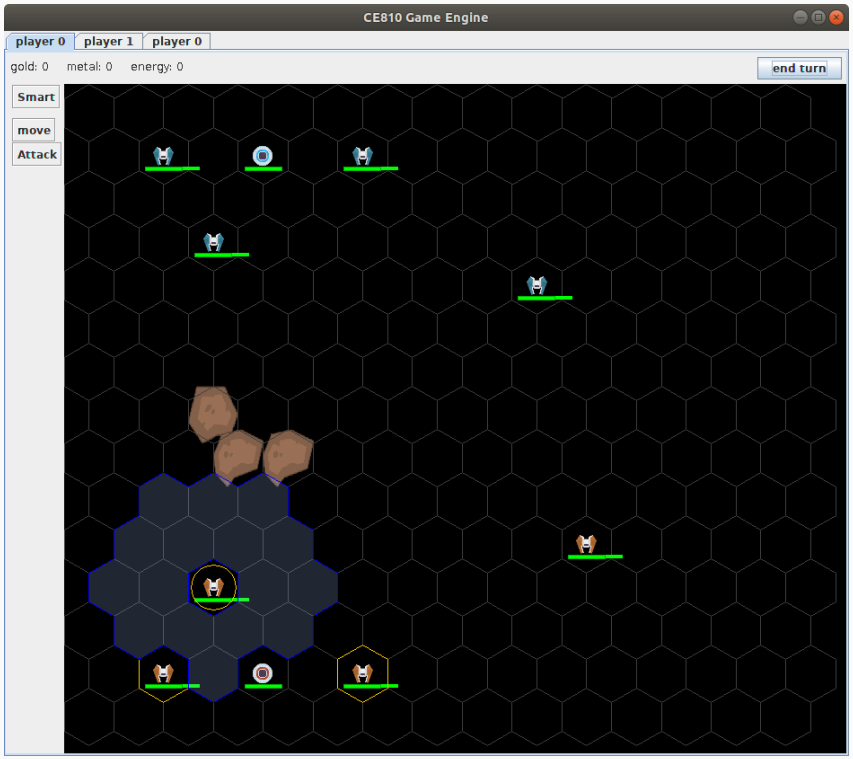
Medieval TBS

- Fairly conventional
- Build on resources for turnly income
- Civilians, archers, and knights

Transmission



Transmission



- Global Game Jam 2018 Entry

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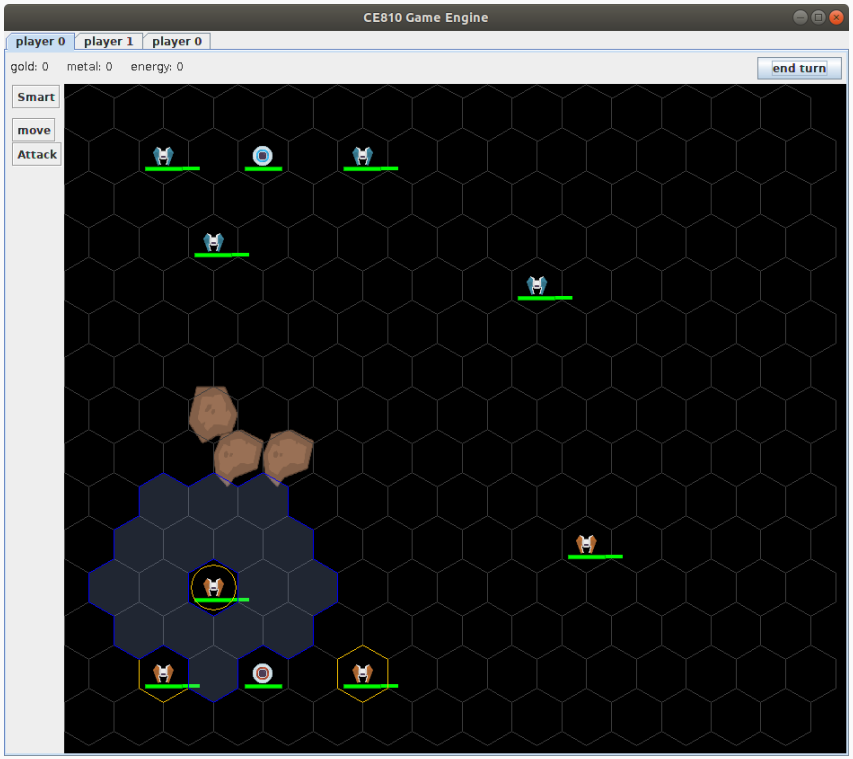

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- Space based TBS

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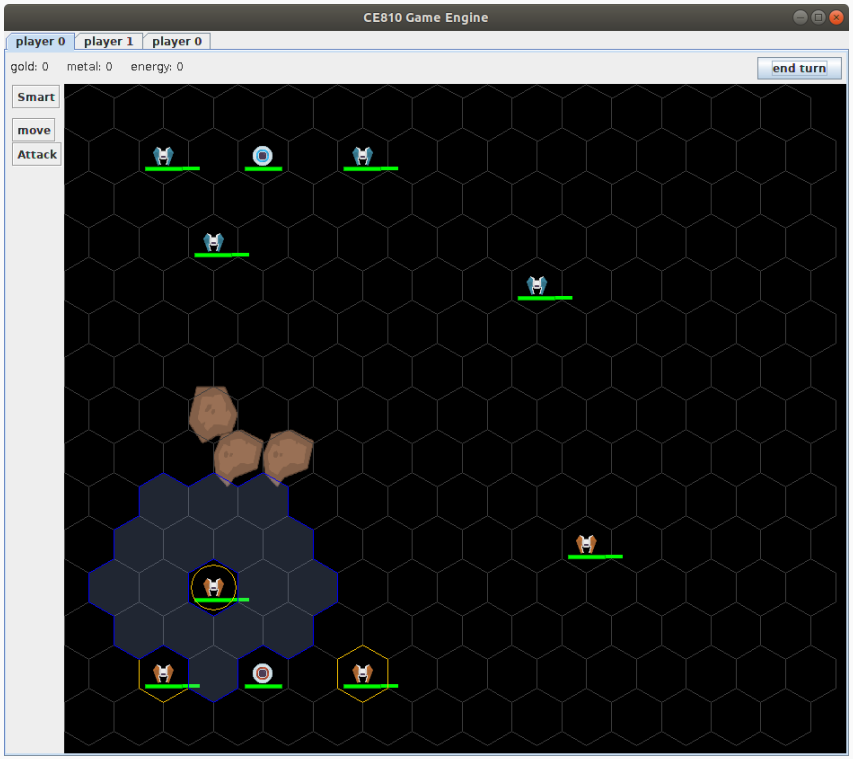

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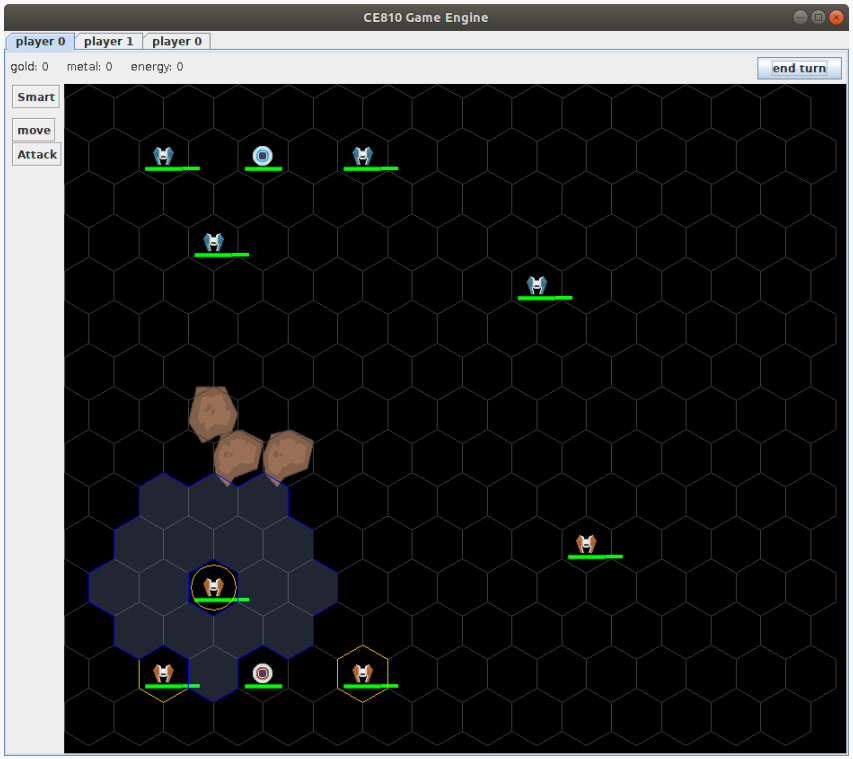

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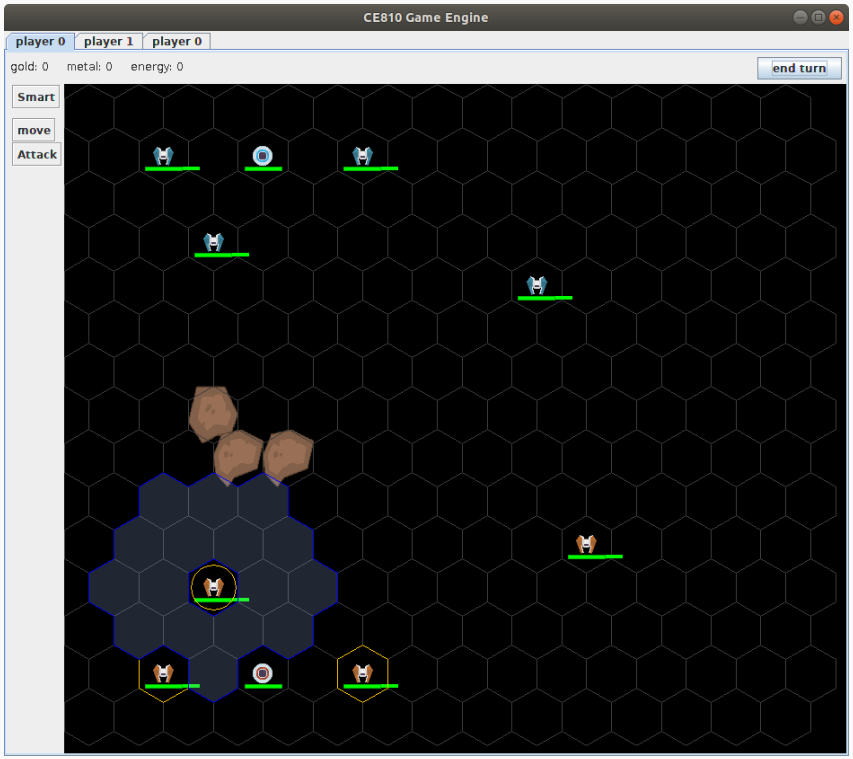

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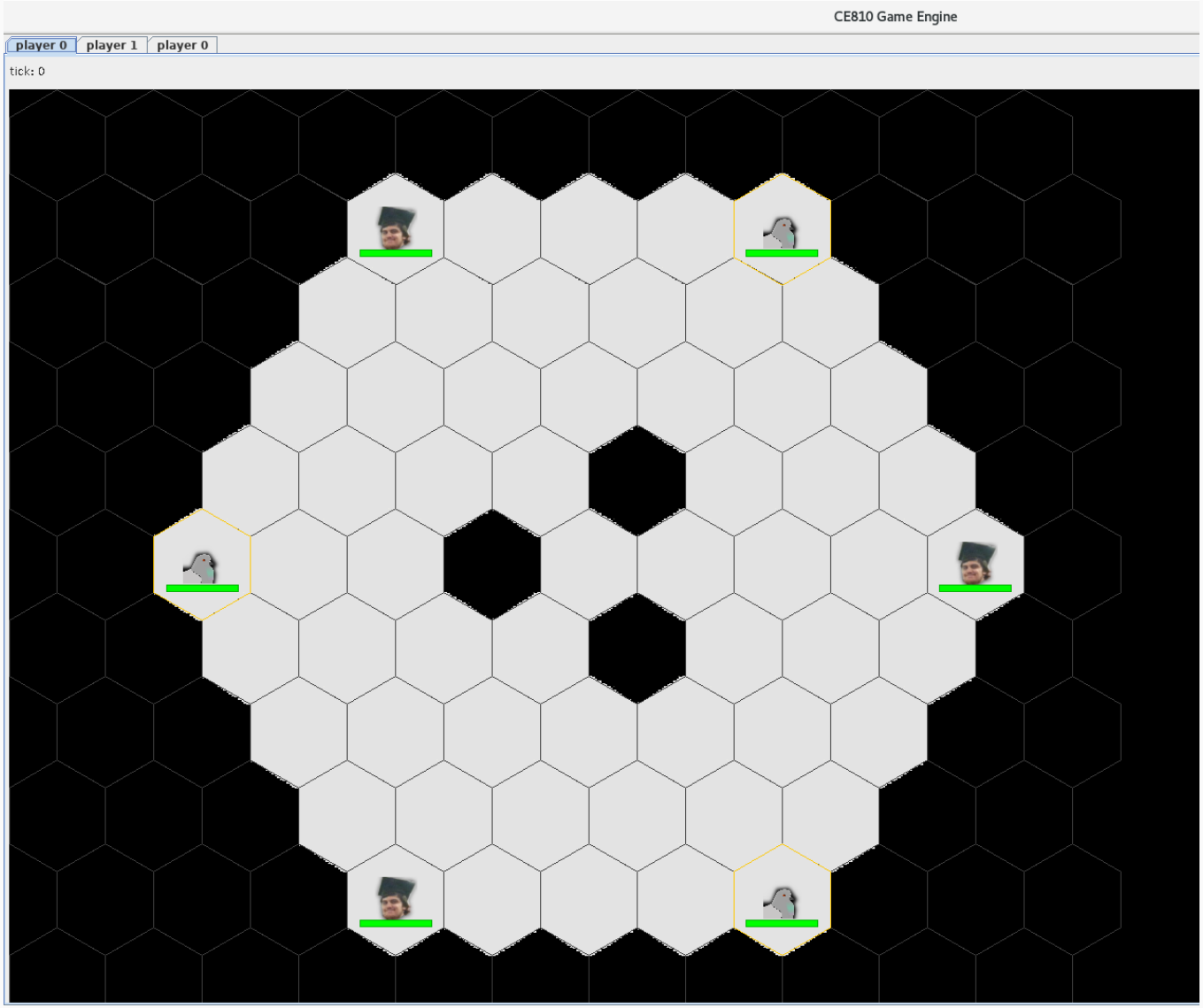
- Space based TBS
- Units must stay **within** transmission range
- Can be **extended** with satellites
- Satellites can be **destroyed**

Hexxagon



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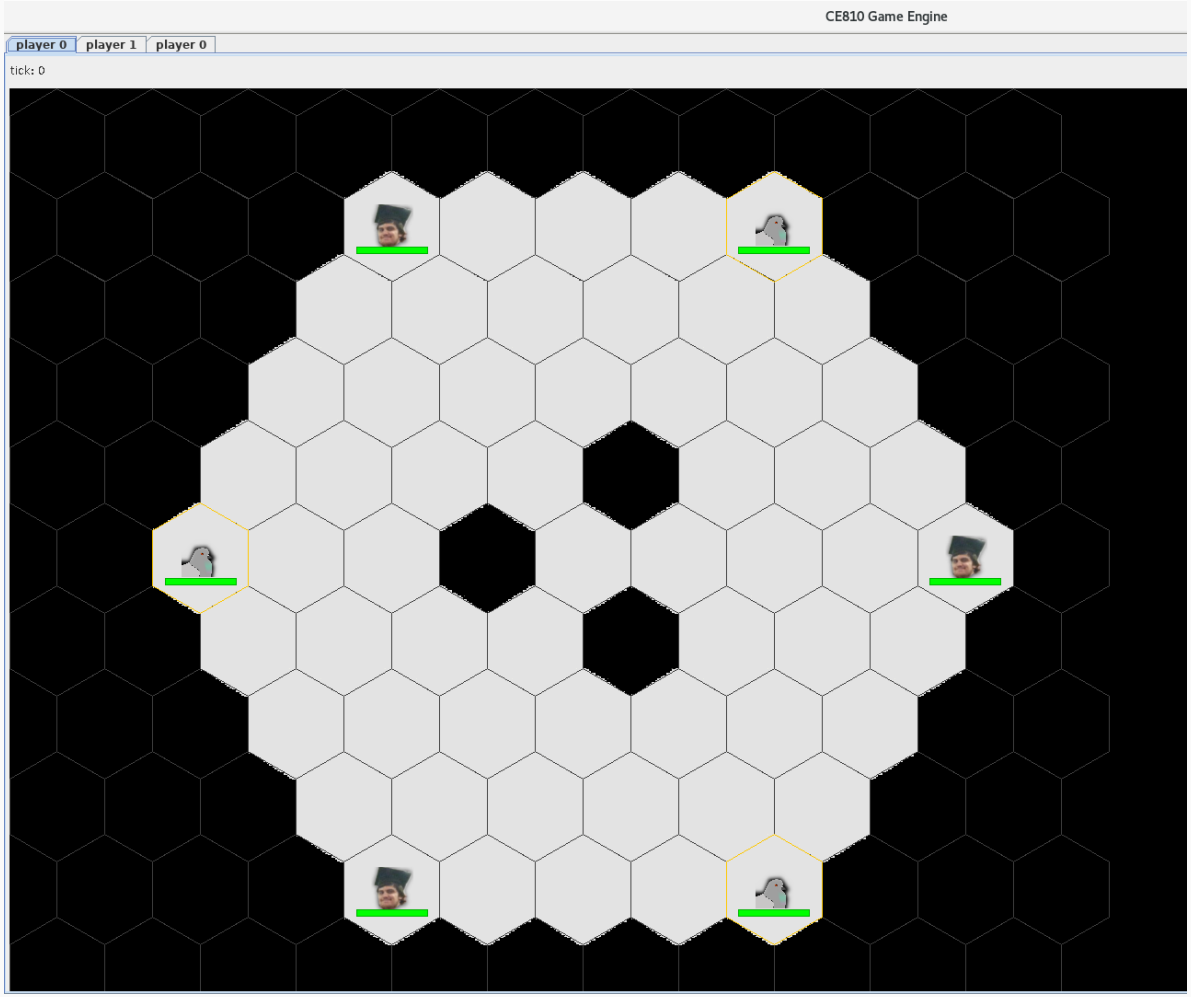
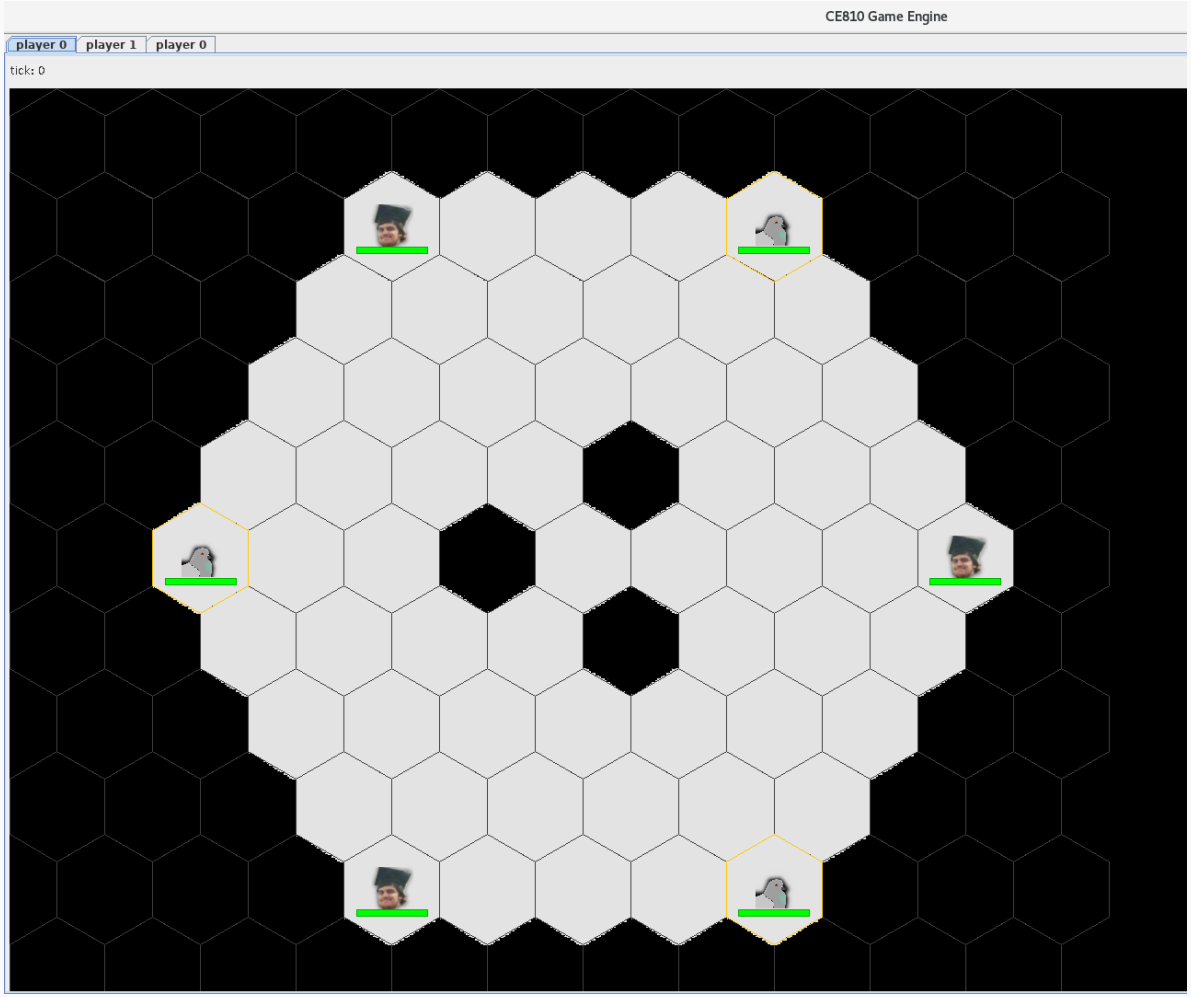


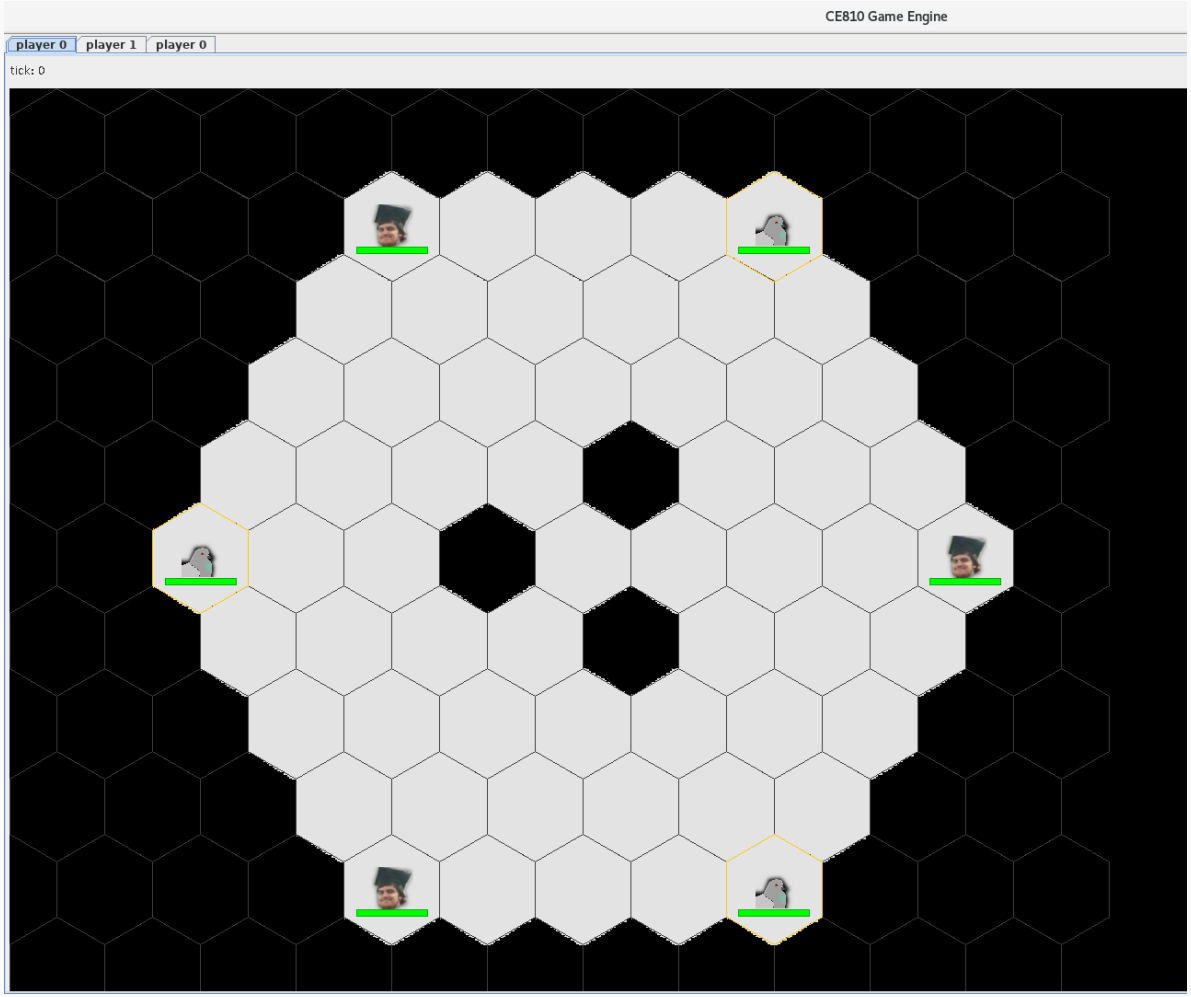
Entity types: piece, piece-p1, piece-p2

Hexxagon



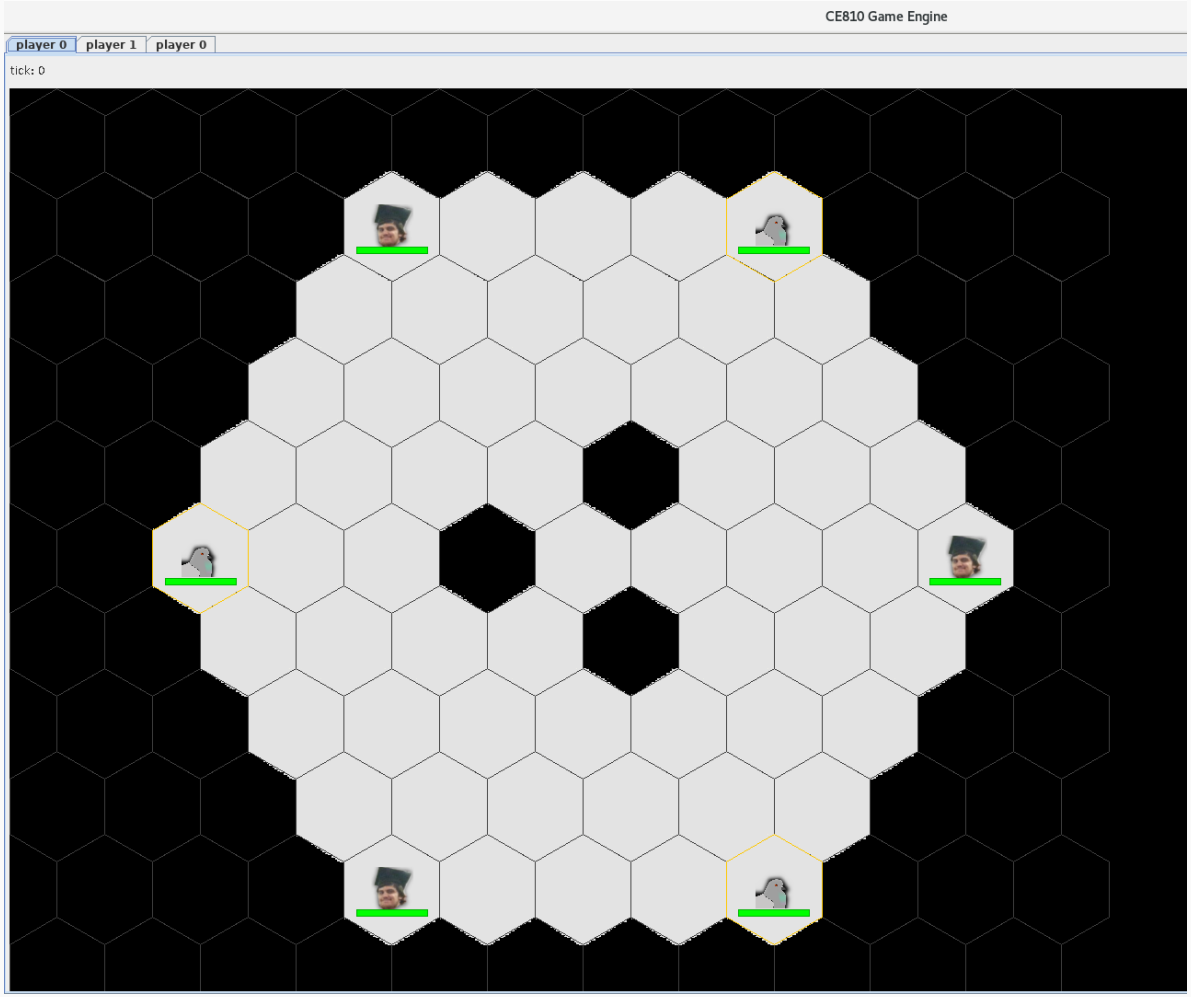
Terrain types: board

Hexxagon



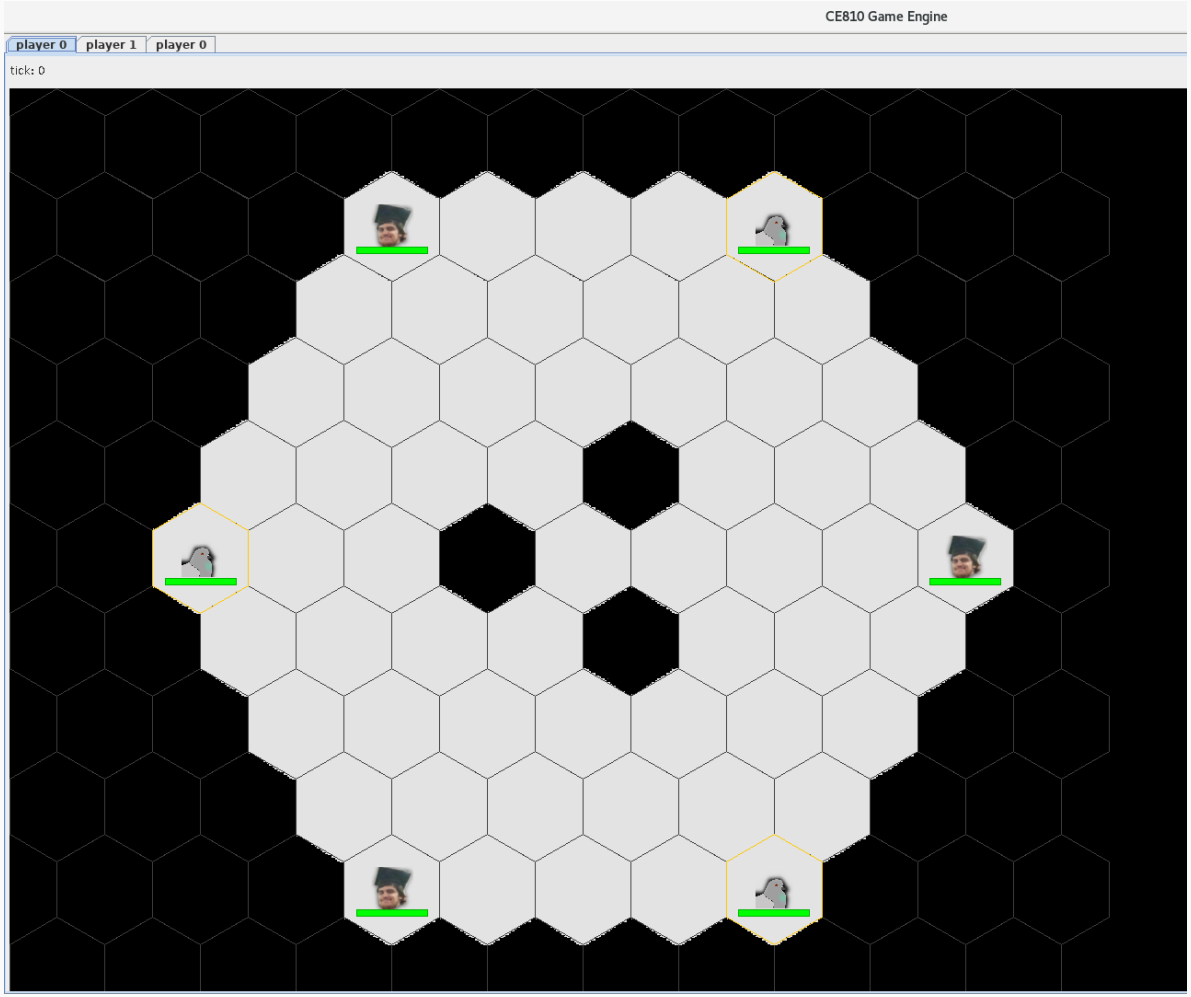
Actions: jump and clone

Hexxagon



Resources: ticks (used to permit moving only one piece)

Hexxagon

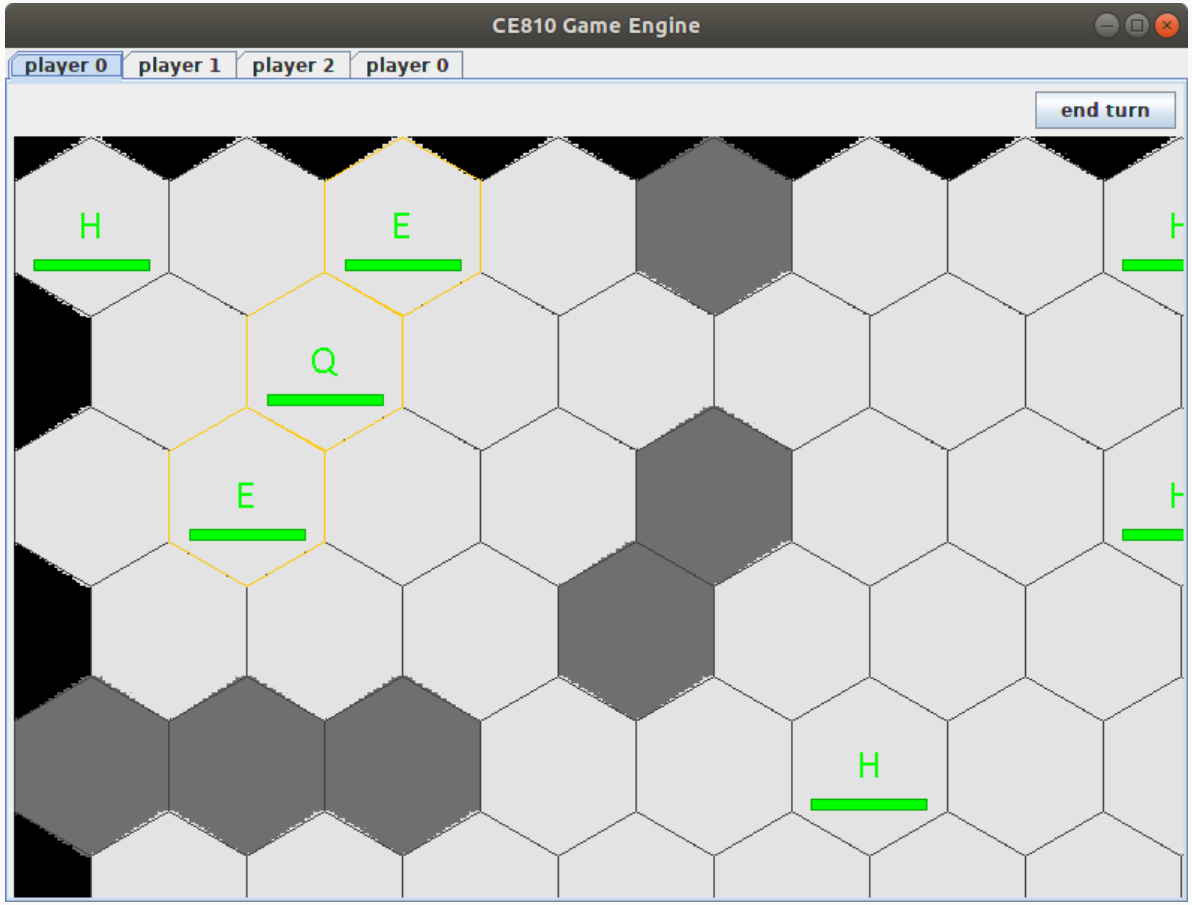


Victory conditions: LastManStanding, MostPiecesLock

Hexxagon Entity Definition

```
{
  "name": "piece", // it's called 'piece'
  "properties": {
    "ter-playzone": 1, // it can 'walk' on
↪  playzone tiles
    "health": 1 // it has 1 health (things
↪  with no health die)
  },
  "_actions":[
    "Jump[tick]", // Jump Action (defined in
↪  Java)
    "Clone[tick]" // Clone action (defined in
↪  Java)
  ]
},
```

Aliens Versus Predators



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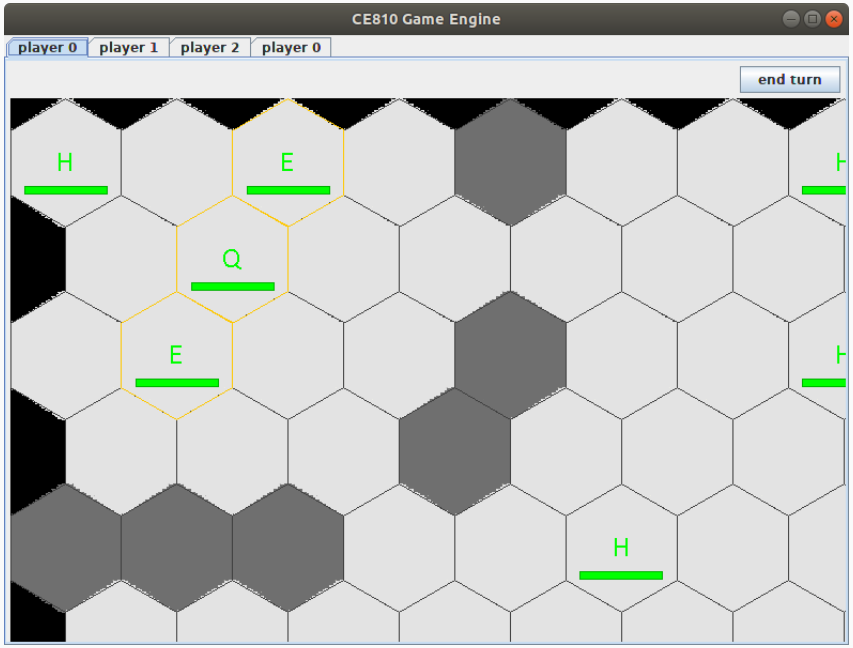
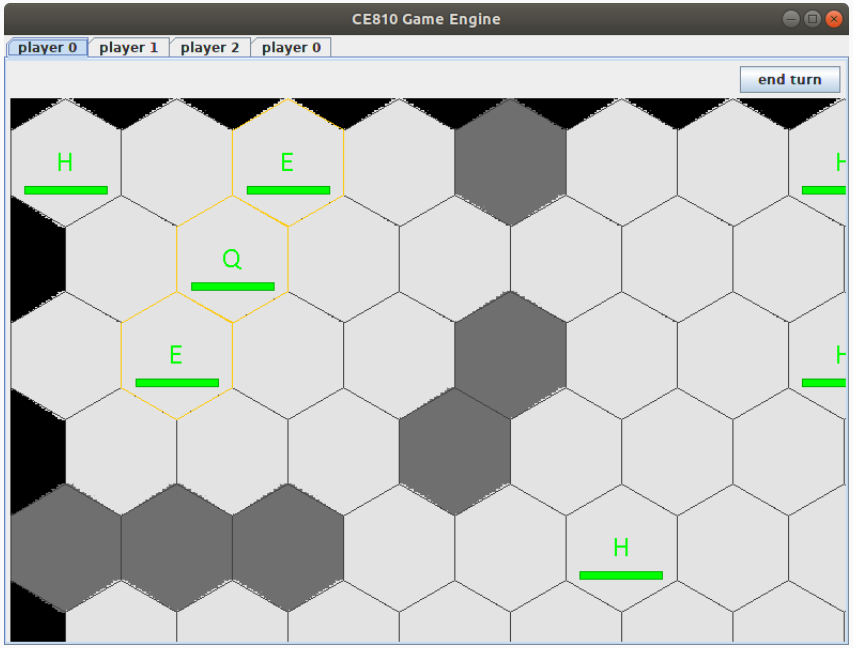


- 3 Teams

Aliens Versus Predators



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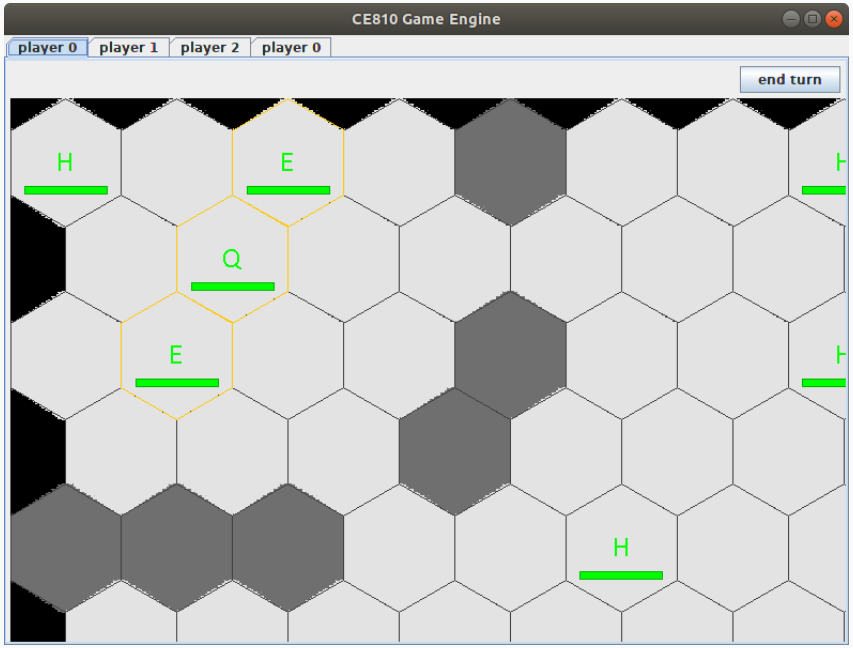

- 3 Teams
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  - Queen Spawn Egg

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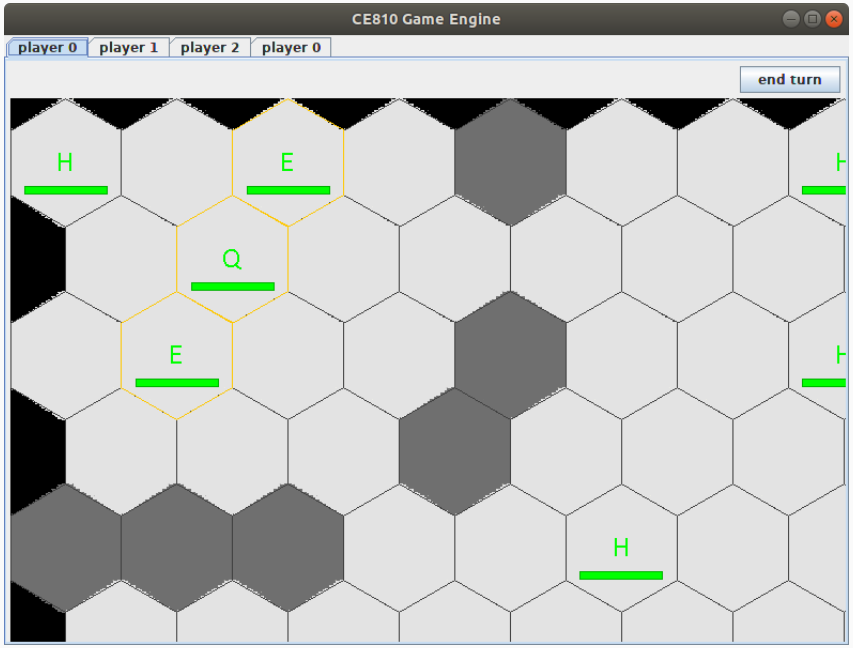

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  - Egg → FaceHugger

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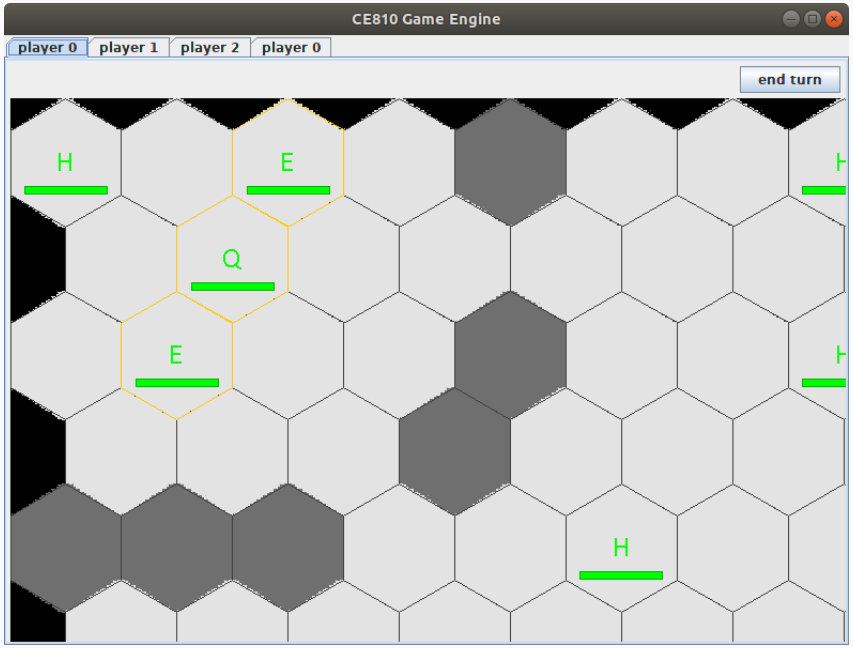

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  - FaceHugger + Human $\rightarrow$ Incubator

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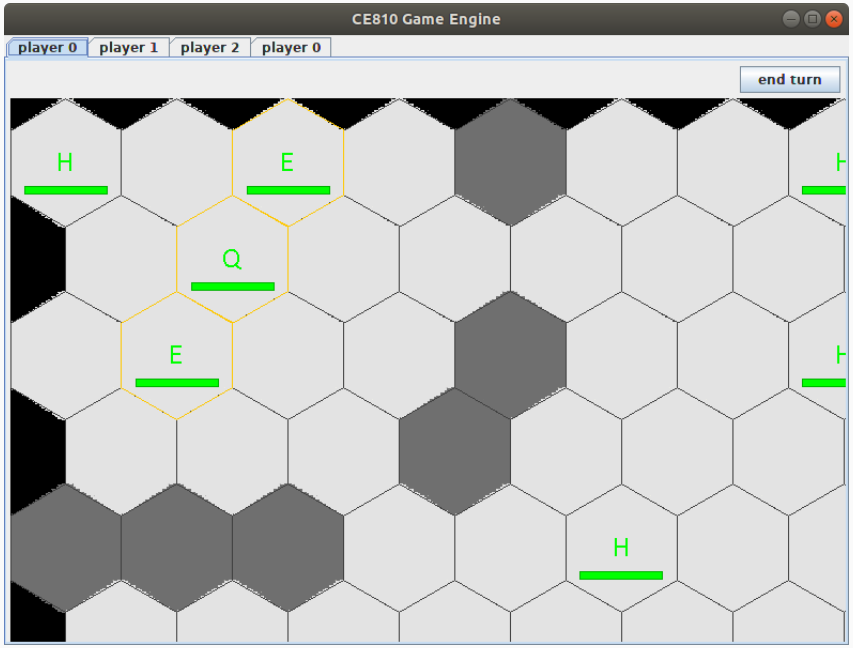

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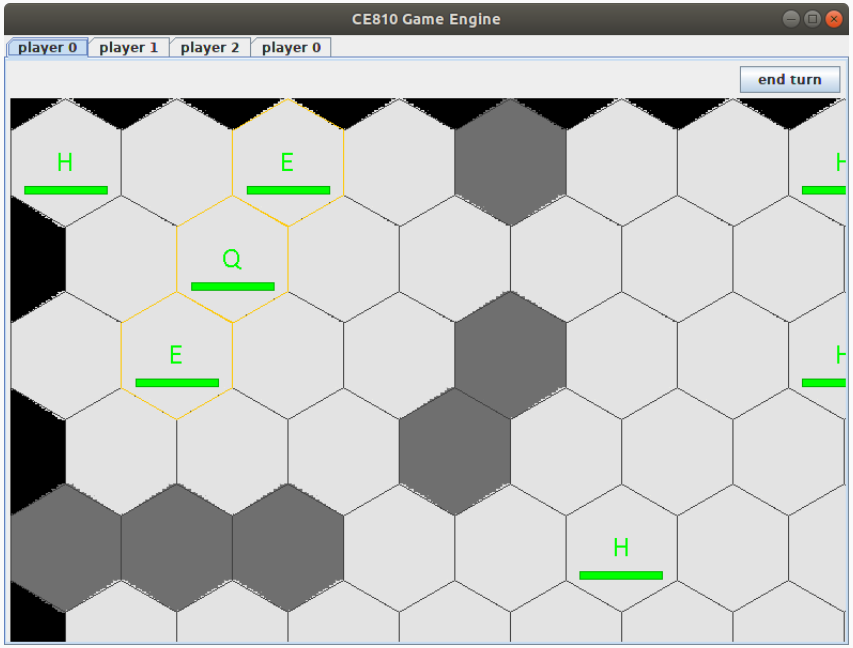

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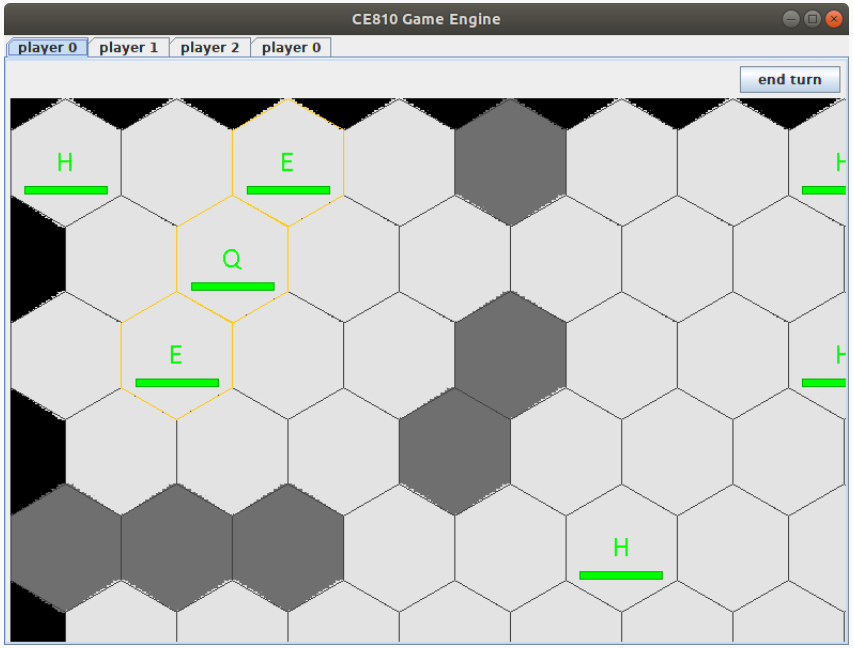

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  - Rules and interesting play are more **important**
  - Graphics serve to **distinguish** between different units

Design Patterns

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- Like programming patterns

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- Many teams may have similar tasks to solve

Design Patterns

- Like programming patterns
- Many teams may have similar tasks to solve
- Some helpful patterns shown here

Movement Lock

Allow the player to only move one piece on their go

- Resource: time

Movement Lock

Allow the player to only move one piece on their go

- Resource: time
- Only allow a move if the resource < current tick

Movement Lock

Allow the player to only move one piece on their go

- Resource: time
- Only allow a move if the resource < current tick
- After a move is made, update the resource to tick + 1

Timers

You can define a timer by doing the following:

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- Create an automatic action that generates 1 timeProperty
- Define the automatic actions as [generateAction, doneAction]