SUPINFO Academic Dept.

SUPINFO International University

INSTITUTE OF INFORMATION TECHNOLOGY

Group Projects
M1 – Development

Project presentation

2012 - 2013

Version 1.0
Last update: 18/10/2012
Use: Students
Author: Samuel CUELLA

TABLE OF CONTENTS

1 PROJECT OVERVIEW

Cummorah Interactive is an innovative company founded to create and manage multi-player games. Their last project is a web-based multiplayer strategy/management game that involves farmers.

Your team has been selected as a subcontractor that will endorse the development based on the functional expression.

The game is about creating and managing a farm (growing, harvesting, …) and trying to extend it as much as possible. The game will involve territory management (conquest and defense) as well as alliances.

The game has to be developed with the following technologies:

- Server side: A JS Webserver, node.js or Wakanda
- Client side: HTML5 (Canvas API)/JS

You're free to use any existing library built on top of the above mentioned technologies.

2 FUNCTIONAL EXPRESSION

2.1 USER ACCOUNTS

Users need to register to play the game. They register using their mail address and a password. There are two user types:

- Users
- Administrators

Users can create only one game per account. They start a new game (or restart when they've destroyed the current game) by selecting a level:

- Easy start with 100% of start money
- Medium start with 50% of start money
- Hard start with 10% of start money

Administrators have the power to modify the value of everything in the game: start money, weapons cost and properties, …

2.2 THE GAME "BOARD" / WORLD

The game board is a tiled square without fixed boundaries. It automatically grows when a new player joins the game. The game is represented in isometric 3D. These images are examples of how isometric 3D renders:

- http://www.happypenguin.org/images/book2.gif
- http://www.upsidelearning.com/blog/wp-content/uploads/2010/03/popular-game-using-isometric-views-e1269942458697.jpg

As the game uses a tiled engine, everything will be rendered in a fixed amount of tiles.

The famer himself is represented by an on-screen character that walks between tiles to perform various actions. The game will scroll following the farmer as he explores the world.

The farmer has to be near a tile to actions on it (seeding, watering, …). Of course if the farmer can't go right near the target tile because of another tile preventing to do so he just has to be near the first reachable tile.

2.3 GAME STARTUP

As this is a multiplayer game, players are expected to have to deal with each other at some point. Therefore, new players should be instantiated not too far from each other, using a fixed tile-radius which will allow users to start their farm without being attacked too quickly while being forced to interact with their neighbors during their development.

If the radius can't be achieved, the server will just grow the game board to allow more room.

2.4 TERRITORY

Each tile of the world can be:

- Owned by the player
- Owned by another player
- Neutral

The farmer can only grow or build on his land.

To "conquer" land, the farmer must attack the coveted tiles. He can only attack a certain amount of adjacent cells at a time. This amount depends on the farmer level. Attacking neutral land just makes the land property of the farmer, whereas attacking land owned by someone else will set off a fight for the land.

Each tile of land has two metrics that will impact crops:

- Humidity (amount of water available)
- Fertility (amount of nutritious elements available)

The humidity will be increased automatically (without watering the tile) when it rains on it. The tile fertility only "heals" at a low rate when nothing is grown on the tile. Note that each tile has an intrinsic fertility level that cannot be naturally exceeded: It will not automatically "heal" past that level. This level can only be raised using fertilizer. Tile's fertility and water level is set "randomly" at tile instantiation. Fertility is distributed by bands, creating fertile and less fertile zones. It means that in a 8x4 tileset, the fertility **cannot** be distributed as follows:

0%	100%	0%	0%	100%	0%	0%	100%
100%	0%	100%	0%	0%	100%	100%	0%
0%	100%	0%	100%	0%	0%	0%	100%
100%	0%	100%	0%	0%	100%	100%	0%

But more like this:

80%	90%	100%	99%	95%	100%	85%	90%
100%	100%	85%	89%	83%	95%	92%	91%
10%	14%	20%	9%	17%	19%	22%	15%
9%	7%	5%	4%	2%	3%	8%	5%

2.5 LEVELS

The farmer level depends on the size of his territory and therefore on the number of tiles owned. Farmers begin at level 0 and gain a level item per number of owned tiles.

2.6 BUILDINGS

Farmers can build the following buildings:

- Silo (1 tile)
- Barn (4 tiles)
- Cold storage (6 tiles)

The silo and the barn are storage facilities that use now power. The barn can store more than the silo but most more. The cold storage store goods and prevent them from withering but uses power when non-empty. The cold storage costs more money.

2.7 GROWING

The farmer can grow various crops such as:

- Tomatoes
- Corn
- Wheat
- …

Each crop as:

- A maturation time / Grow rate (time from seeding to harvest)
- A decay time (The time by which the plant will stay at 100% without withering)
- Productivity (amount of harvest per tile at 100% health)
- Storability (amount of time that the crop can be stored without withering)
- Seed price (the amount the farmer has to pay to seed a tile)

The farmer must take care of his crops tile per tile. Each tile has two metrics: a “health” level and maturity level that must be represented by different sprites.

The health level will be represented by a different sprite from:

- Good 100%-80%
- Medium 80%-60%
- Average 50%-40%
- Low 40%-20%
- Bad 20%-0%

The crop health on the tile is directly impacted by the tile metrics, humidity and fertility, as described before.

The maturity indicator from will also be represented by sprites for:

- Seeded from 0% to 10%
- Seedlings from 10 to 30%
- Little plants from 30% 60%
- Plants from 60% to 80%
- Mature plants from 80% to 100%

When the farmer grows something on the tile, these two metrics automatically decrease over the time as crops grows, i.e. the crop consumes the tile’s water and nutritious elements. The farmer has to keep humidity by watering (if the rain isn’t sufficient) the tile and keeping the soil fruitful by using fertilizer (if he doesn’t want to let the tile unused by the time it regenerates naturally).

Using fertilizer costs money per 10% percent of fertility restored.

2.8 HARVEST, STORAGE AND MARKET

When crop has reached its maturity (from 80% to 100%) the tile can be harvested. The farmer can choose to sell the crop right away (harvest & sell) at the current crop market price or to store it to sell it later if he hopes that the market price will move up.

The crop market indicates the buying price of all crops. It's going up and down "randomly" over the time.

The farmer can store his crops in silos/barns he has built. Each storage facility can store up to a specific amount of crop. The stored crop must be sold within a specific amount of time (crop-specific) before it withers. If the farmer waits too much to sell the stored crop, he will lose it.

The farmer also has the option to build and use a cold storage. Cold storages works just like silos/barns but they can store crops indefinitely (no storage time). However, running the cold storage costs money (over the time) while operating (no cost if empty).

2.9 FIGHTS

When the farmer wants to extend his farm he can:

- "Conquer" neutral tiles
- Try to conquer territory from other players

As stated before, the procedure is the same: Attacking to coveted tiles. In the case where tiles are neutral, the farmer automatically gains them. However, if the attacked tiles belong to another player, a fight begins, where the other player will have to fight for his land.

When a player gets some of his tiles attacked, he has to defend his territory. He gets notified of the attack and the attacked tiles start to blink.

The farmer can attack a fixed number of adjacent tiles at a time. This number depends on the player level. The farmer has to attack tiles, he has to go "by himself", by moving his character to the location.

During their fights, farmers use weapons. Each weapon has the following properties:

- Power (damage per hit)
- Hit ratio (Odds to hit the opponent: 100% hits every time while 50% misses 1 time out of 2)
- Hits per second
- Price

All farmers have the default weapon, a fork.

The following weapons are available:

- Fork

- Baseball Bat
- Chainsaw
- AK-47

For each weapons, there is an attack animation where the player sees the farmer using the weapon.

Farmers have a health indicator with health points. The maximum number of points depends on the farmer's level. During a fight, the first to drain the other's health wins. The looser doesn't die but have to take a rest time for his health to regenerate. The regeneration speed depends on the farmer level. During his rest, he can't fight or harvest. He can however water and fertilize his crops.

If the attacker wins, he wins the territory but he can't attack the same farmer's land right away. He must wait a fixed amount of time that depends on the attacked player level (the higher is the level, the lower is the time) before he can attack him again.
If the attacked player wins he keeps his land and he can counter-attack on the initial attacker land without any grace time. This is an exception to the above-mentioned grace time rule.

Of course, if there is a gain/loss of territory, the concerned player level is adjusted accordingly.

2.10 ALLIANCES

Players can conclude alliances. Allied players cannot attack each other anymore and see allied-owned tiles as neutral but not attackable. Allied levels become dependent on the allied-owned tiles. In other works, if farmer "A" who owns 51 tiles allies with farmer "B" who owns 49 tiles, they both get a level raise as if they've owned 100 tiles.

Allied players are supposed to defend each other's tiles when attacked. Attacked allied tiles blink when attacked and the allies get notified as if the territory was theirs. A farmer can take care of his allies crops (water, fertilizer), but cannot harvest them. There is no revenue sharing system either.

Any player can quit an alliance as he sees fit. He then automatically lost levels as his level doesn't include other player's territory. If more than two players are allied, one quitting the alliance will have no more consequences for the alliance than the loss of power linked to the number of tiles controlled downing.

2.11 NATURAL EVENTS

Natural occur periodically and randomly. There are two types of natural events: Located events and moving events.

Located events have a center location (x,y) and an area / radius (number of tiles) of effect and a duration. Moving events have the same properties plus a displacement vector.

Natural events can be positive (rain that adds humidity to the soil) or negative (destroy crops, buildings or negatively affect tiles).

The following natural events have to be implemented:

- Rain (restore humidity)
- Tornadoes (moving) (destroy everything on the affected tiles)
- Meteor showers (destroy everything on the affected tiles)
- Grasshoppers (destroy crops)

Natural events can occur anywhere in the world and impact one or more player. A tornado sweeping the map will typically impact many players.

2.12 OFFLINE BEHAVIOR

The world constantly runs, even when players are not connected. Time continues to run, and disasters can happen. If the farmer is attacked when the player his offline he will automatically defend his land with his best weapon. However he won't perform any farming task on his own.

As the time continues to run, a farmer walking nearby the farm off an offline player should see his crops growing or dying out of care.

3 DELIVERABLES

Students should include the following elements in their final delivery:

- A zip archive with the project source code.
- Project documentation, based on the template.
    - Technical documentation explaining your choices and/or implementation choices/details on the following items (at least):
        - 3D Engine
        - Internal world representation structures
        - Client / Server protocol
        - World loop / Events triggering
        - World persistence
    - Game manual

The first document is an academic document. Address the reader as a teacher, not a client. The last one (game manual) should address the reader as a user. These documents can be in French or in English, at your option.

4 GRADED ITEMS

The project will be graded as follows, on a 239/229 scale:

Documentation (2 points)
- Spelling and grammar (0.5 points)
- Relevancy (0.5 points)
- Technical documentation (1 point)

User and accounts (6 points)
- Users can register (2 point)
- Users can choose a difficulty level (1 point)
- Administrators can edit the game settings (3 points)

Game board (15 points)
- The game board is a tiled square in iso-3D (3 points)
- The iso-3D farmer character can walk the board (4 points)
- The board scrolls as the player walks (3 points)
- The farmer has to be near tiles to do actions on them (2 points)
- The engine generates fertility by bands (3 points)

Game startup (6 points)
- The player starts within a fixed radius from others (2 points)
- The world grows as needed (4 points)

Territory (16 points)
- Farmer can attack tiles to make them his (2 points)
- The farmer can attack up to X tiles at a time, X depending on his level (3 points)
- Attacking already owned tiles touch off a fight (3 points)
- Each tile has humidity and fertility (2 points)
- Humidity can be raised by rain (natural) or watering (farmer) (3 points)
- Fertility can be raised by fertilizer(farmer) or no growing on it(natural) (3 points)

Levels (4 points)
- The farmer level depends on the number of owned tiles. (2 points)
- Level fluctuates whenever the number of owned tiles changes (2 points)

Buildings (15 points)
- The farmer can build buildings on his tiles (3 points)
- Silo and barn store goods (4 points)
- Storage amounts (tiles of crop) can be defined by admin per building (2 points)
- Cold storage store goods indefinitely (3 points)
- Cold storage cost power when non-empty (3 points)

Growing (42 points)

- The farmer can grow various crops on his tiles (7 points)
- Each crop has maturation time, decay time, productivity, storability and seed price (4 points)
- Each crop tile has individual health depending on water and fertility (4 points)
- Each crop tile is represented by a different sprite depending on health (5 points)
- Each crop tile grows over the time (5 points)
- Each crop tile is represented by a different sprite depending on maturity (5 points)
- The crop tile consumes the tile humidity and fertility while growing (4 points)
- The farmer can water (and watering increase the tile humidity) a tile (4 points)
- The farmer can fertilize (and fertilizing increase the tile fertility) a tile (4 points)

Harvesting (26 points)

- A mature-enough crop tile can be harvested (6 points)
- The farmer can sell harvested crop immediately (8 points)
- The farmer can store in storage buildings if there is enough room left (6 points)
- The price of the various crops fluctuate over the time (6 points)

Fights (49 points)

- Attacked tiles blink (3 points)
- Farmers can have different weapons (3 points)
- Different weapons have power, hit ratio, hits per second, price (3 points)
- Farmers can use their weapons during fights (5 points)
- There is an animation for each weapon (5 points)
- Farmers can defend their land (3 points)
- Farmers have health points (2 points)
- Farmer health points depends on their level (3 points)
- The first to drain the other's health wins the fight (1 points)
- The looser have to rest to regenerate life (3 points)
- Regeneration speed depends on the level (2 points)
- A "resting" farmer cannot fight or harvest but he can water or fertilize (3 points)
- The winner takes the land. (3 points)
- The winner cannot attack the same farmer again during a grace time (3 points)
- The grace time depends on the attacked level (higher level, lower time) (3 points)
- If the attacked player wins he can counter-attack with no grace time (4 points)

Alliances (21 points)

- Players can create alliances (2 points)
- Players can invite/join/quit alliances (3 points)
- Allied players cannot attack each other (2 points)
- Allied players see other plays tiles as neutral but not attackable tiles (3 points)
- Allied players level depends on the alliance-controlled tiles number (2 points)
- Alliance controlled-tiles blink for every allied player when attacked (3 points)
- Allied players can defend the alliance territory as their own (3 points)

- Allied can take care of each other's crops (3 points)

Natural events (12 points)

- The engine makes natural events to occur (3 points)
- Rain (2 points)
- Tornadoes (moves) (3 points)
- Meteor showers (2 points)
- Grasshoppers (2 points)

Offline behavior (15 points)

- The world constantly runs (growing, withering, …) (6 points)
- The farmer will automatically defend himself with his best weapon (3 points)
- Other players see the farm "living" (crops growing, withering, …) (6 points)

Bonus (10 points)