



Tower Defense framework

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Ciel' projektu

Vytvorit' 2D Tower Defense framework:

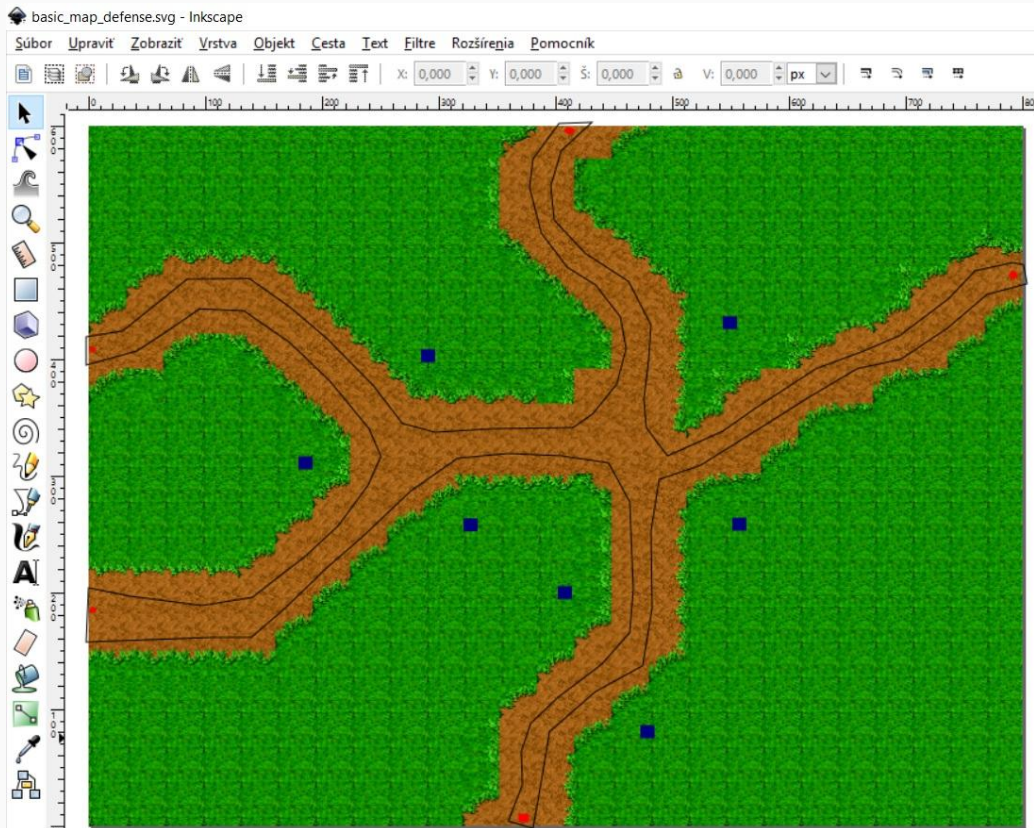
- Jednoduchý na používanie
- Možnosť skriptovania
- Správa assetov
- Podpora replay-ov
- Multi-platformový:
 - Windows
 - Android (rozšírenie na BP)

3rd party libraries (and other resources)

- **MonoGame**: Multi-platform game framework
- **MoonSharp**: LUA interpreter for .NET, Mono
- **EmptyKeys**: Multi-platform UI framework

- **Graphics**: Animované postavičky a environment-tilesets
 - <http://www.reinerstilesets.de/>

Levely



basic_map_defense.tas - Notepad

File Edit Format View Help

```
# ----- #
# File basic_map_defense_navi.tas will be loaded too #
# (can be generated from svg using MapDataParser) #
# ----- #

# Background texture
BACKGROUND;basic_map.png

# Empty tile texture (place where towers are built)
FREEPOINT;action_point.png

# All soldiers needed for current level separated by ";"
TROOPS;monk;knight

# All towers needed for current level separated by ";"
TOWERS;basic_tower;stronger_tower

# ----- #
# All game-events sorted by time #
# Event types: #
# 1) ANNOUNCEMENT;TEXT_MESSAGE #
# 2) SPAWN;ENTITY_NAME;PATH_ID #
# ----- #

00:00:0.000000;ANNOUNCEMENT;First wave of enemies incomming!
00:00:1.000000;SPAWN;knight;0
00:00:3.000000;SPAWN;monk;0
00:00:5.000000;SPAWN;knight;1
00:00:7.000000;SPAWN;monk;1
00:00:9.000000;SPAWN;knight;2
00:00:11.000000;SPAWN;monk;2
00:00:13.000000;SPAWN;knight;3
00:00:15.000000;SPAWN;monk;3
```

Pridávanie jednotiek / veží / spellov

- Obsah vytváraný na základe konfiguračných súborov
- Súbor obsahujú základné informácie o danom hernom objekte
- K týmto objektom následne nájde informácie o priradených animáciach a statických textúrach, ktoré pridá na zbalenie. Výsledkom je pred každým levelom postavený spritesheet(s).
- Jednotky, veže aj spelly musia mať ešte priradené skripty s implementovanými príslušnými metódami, ktoré sú volané počas update-metód.

```
spells.tas - Notepad
File Edit Format View Help
# -----
# This file contains definition and basic attributes for all spells
# (name_of_spell)      - string containing unique name of the spell
# (cooldown)          - defines time period during which spell cannot be casted again
# (cast_time)         - defines time period required to cast spell
# (range)             - defines maximum range at which spell can be casted
# (type)              - defines type of spell: DIRECT/ALL/SPECIAL
#
# Example: (name_of_spell);(cast_time)(cooldown);(range);(type)
# -----

heal;2000;1000;150;DIRECT
protection;20000;500;100;DIRECT
```

```
troops.tas - Notepad
File Edit Format View Help
# -----
# This file contains definition and basic attributes for all troops
# (name_of_unit)      - string containing unique name of the troop
# (hitpoints)         - represents initial health of the troop (1-65536)
# (speed)            - determines how many pixels travel the troop per second
# (unit_cost)        - determines how much must player pay in order to recruit
# (unit_worth)       - determines how much player gets after killing unit
# (size)             - represents initial size in float (1.0 means default)
#
# (name_of_unit);(hitpoints);(speed);(unit_cost);(unit_worth);(size)
# -----

monk;10;0.3;25;10;0.6
knight;20;0.3;30;10;0.6
```

Skriptovanie

- MoonSharp implementuje interpret pre verziu LUA 5.2 - s malými rozdielmi
- Scripting features:
 - Skriptovanie pre spelly, jednotky a veže
 - Volanie C# kódu iba na základe vopred pridaného interfacu
 - Podpora pre debuggovanie embedded skriptov pomocou Visual Studio Code (breakpoints, conditional breakpoints, local variables, watches, call stack..)
 - Možnosť púšťania skriptov v režime full trust / partial trust
 - Ukladanie perzistentných premenných pomocou objektu v C#

Optimalizácie skriptovania

globals.lua*

casting

```
12 local globals =
13 {
14     variables =
15     {
16         ----- [ ENGINE VARIABLES ] -----
17         Alive = 1, -- Boolean
18         HP = 2, -- Int32
19         MaxHP = 3, -- Int32
20         Speed = 4, -- Float
21         Size = 5, -- Float
22         Cost = 6, -- Int32
23         Worth = 7, -- Int32
24         Size = 8, -- Float
25         ----- [ CUSTOM VARIABLES ] -----
26         FrostResistance = 100
27     },
28     spells =
29     {
30         ----- [ CUSTOM SPELLS ] -----
31         heal = 5000,
32         protection = 5001
33     },
34     troops =
35     {
36         ----- [ TROOPS IDENTIFIERS ] -----
37         monk = 6000,
38         knight = 6001
39     },
40     towers =
41     {
42         ----- [ TOWERS IDENTIFIERS ] -----
43         basic_tower = 7000,
44         stronger_tower = 7001
45     }
46 }
```

monk.lua*

OnUpdate

```
1 ----- [ SCRIPTING HEADER ] -----
2 ----- [ SCRIPTING HEADER ] -----
3 ----- [ SCRIPTING HEADER ] -----
4 local _table = require 'globals.lua';
5 local variables = _table.variables;
6 local spells = _table.spells;
7 local troops = _table.troops;
8 local towers = _table.towers;
9 ----- [ /SCRIPTING HEADER ] -----
10 ----- [ /SCRIPTING HEADER ] -----
11 ----- [ /SCRIPTING HEADER ] -----
12
13 function OnUpdate()
14     -- Update logic:
15     if (obj.CanCast(spells.protection)) then
16         if (obj.Target(spells.protection, targettingModifier.MostDamaged)) then
17             obj.StopWalking();
18             obj.CastSpell(spells.protection);
19             return;
20         end;
21     end;
22     if (obj.IsCasting() == false) then
23         obj.ContinueWalking();
24     end;
25 end;
26
27
28 function OnInit()
29     -- Initialization logic (runs only once)
30 end;
31
32 function OnDying()
33     -- Run when troop is about to die (run only once)
34 end;
```


Rozšírenia / Todo list

- Podpora pre Android
 - Rôzne pomery strán, rozlíšenie textúr..
 - Vstup z dotykového displeja
- Skriptovanie friendly jednotiek
 - Veže budú môcť poslať na mapu friendly jednotky pomáhať brániť
- Nový systém vkladania máp
 - Lepšia podpora pre pridávanie viac nezávislých ciest na mape

Demo