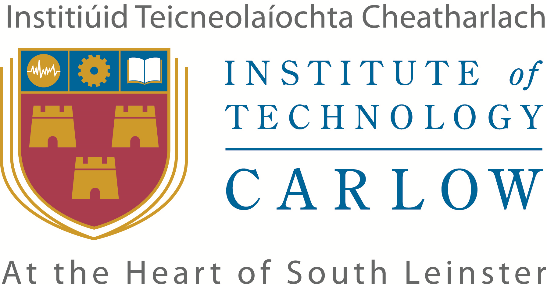


Computer Games Development CW208

Technical Design Document

Year IV

Przemyslaw Tomczyk  
C00218004  
3rd of May 2020

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**Faculty of Science**

Open-Book and Remote Assessment Cover Page

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**Declaration**

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# **Features**

## Interactable Grid

Tasks:

1. Create GridTile class to hold and render rectangles
2. Create GridManager to create and hold a grid worth of tiles
3. Add tile types to GridTile
4. Add mouse and keyboard input
5. Make GridTile react to input and change type and colour
6. Add LoadLayout function to load different grid layouts
7. Add more input to alter the grid quickly and easily

## A\* Algorithm

Tasks:

1. Import previously created A\* algorithm
2. Change A\* from “offline” to “online” (remove preprocessing from it)
3. Minor optimisation to make A\* better

## REA\* Algorithm

Tasks:

1. Read REA\* paper
2. Implement InsertS function.
   1. This will expand a rectangle from start tile’s location
3. Implement Successor function.
   1. This will take the rectangle from InsertS and calculate Free Sub Interval (ENI).
   2. It will then use ENI to calculate Free Sub Intervals (FSI). There will only be one FSI if the entire ENI is unblocked.
   3. For each FSI and each point in FSI, set them up with heuristics.
   4. If at least 1 point was updated in FSI, add it to the priority queue of nodes.
4. Implement Expand function
   1. This will expand a rectangle from Current Best Node (CBN) which is the top item in the priority queue
   2. Set up each border in the expanded rectangle
   3. Call Successor on the expanded rectangle.

# 

# **CRC Cards**

|  |  |
| --- | --- |
| ***Class Name :*** Game | |
| Subclasses: | |
| Superclasses: | |
| Responsibilities | Collaborators |
| Create window |  |
| Update loop |  |
| Specify grid layout |  |
| Initialise grid layouts |  |

# 

|  |  |
| --- | --- |
| Class Name : GridManager | |
| Subclasses: | |
| Superclasses: | |
| Responsibilities | Collaborators |
| Create grid | GridTile |
| Setup tiles | BoundaryNode |
| Process key presses on tiles | SearchNode |
| Handle both algorithms |  |

# 

|  |  |
| --- | --- |
| ***Class Name :*** GridTile | |
| Subclasses : | |
| Superclasses : | |
| Responsibilities | Collaborators |
| Hold heuristics for algorithms |  |
| Display type of tile |  |
| Hold pointers to previous tile for backtracking |  |

# 

|  |  |
| --- | --- |
| Class Name : BoundaryNode | |
| Subclasses : | |
| Superclasses : | |
| Responsibilities | Collaborators |
| Hold index values of tiles in a boundary | SearchNode |
| Hold ExtendedNeighbourInterval(ENI) | GridTile |
| Hold temporary FreeSubIntervals (FSI) |  |
| Direction of expansion of parent search node |  |

# 

|  |  |
| --- | --- |
| Class Name : SearchNode | |
| Subclasses : | |
| Superclasses : | |
| Responsibilities | Collaborators |
| Used in priority queue to sort and find CurrentBestNode | GridTile |
| Holds index values of tiles in the interval |  |
| Holds direction of expansion |  |
| Holds smallest heuristic value from the interval |  |