Final Project: Space Invaders

Student Information

Integrity Policy: All university integrity and class syllabus policies have been followed. I have neither given, nor received, nor have I tolerated others' use of unauthorized aid.

I understand and followed these policies: Yes   No

> Name:

> Date:

Submission details

Code Path:
(Perforce Path)

Changelist Num:
(one to grade)

Verified Build: Yes   No
(Do not check unless you did verify)

YouTube Link:
(Please verify sound and quality)

Design Doc Path:
(Perforce Path to PDF)

Design Details

Design Patterns completed and _use_ in your code: *(min Required – in red)*

Singleton	**Factory**	**Observer**
Flyweight	**Proxy**	**Command**
Iterator	**State**	**Composite**
Strategy	**Visitor**	**Object Pools**
Null Object	Adaptor	Template

Design Document PDF

Completed and submitted

Video Submitted

Demos each feature

Loud and Clear Sound (Can hear your voice easily)

Large Screen capture for Game Screen not the full desktop

Toggle Bounding Boxes on/off

Game Evaluation

Game Cycling

Select Screens --> Game Screens --> GameOver Screen --> Select Screens

Screens Completed

Select Screen

Game Screen

GameOver Screen

Game Play

Complete at least 2 levels without crashing

Each level progressively harder and faster

Toggling bounding boxes on and off (Need to Demo)

2 Player mode -- EXTRA CREDIT

Player takes turns playing one at a time

Each player's game assets are unique to the player

Number of Aliens, Shield Damage, Score, etc.

Each player plays until they die, then next player plays if they still have lives left.

Once both players die, then go to Game Over screen

Score

High Score being updated

Different points for Aliens, UFOs, etc

Player

Movement

Number of lives

Launch on missile at a time

Collision Verification

Missile vs Shield

Missile vs Alien

Missile hits top of screen

Missile hits UFO

Missile hits Alien Bomb

Alien Grid versus each wall

Player Icon - right / left limits

Alien Bomb vs Player

Alien Bomb vs Floor

Alien Bomb vs Shield

Alien Grid

5x11 grid (Squid, Crab, Octopus)

Animation Movement in **synchronization** with movement

Progressively faster as number of aliens goes down

Music tempo and marching is faster as number of Aliens goes down

Drops different types of bombs (at least 3 different types) from bottom Alien

Explosion Splat when Alien is struck by missile

Explosion Splat when Alien Bomb is hit by missile

Killed Aliens adds points to player's score

Different points for different types of Aliens

UFO

Launches at different random intervals

Moves horizontally from Left or Right side

Drops Bomb

Plays unique Sound when UFO is on screen

Explosion sprite animation when UFO is killed

Killed UFO add points to Player's score

Missile / Bombs

Missile and Bombs can hit and kill each other

Splat animation when Missile and Bombs hit each other

Bombs Dropping (at least 3 different modes)

Zig Zag

Rolling

Straight

One Bomb at a time from each alien column

Shields

4 Shields on the Screen

Impedes Missiles or Bombs from traveling through shield

Multiple hits can create holes in shields (need to demo this)

Graphical noise base Dissolve effects (optional)

Sounds

Audio of Aliens marching, synchronized with animation and movement

Cycles 4 sounds for the alien march sounds

Missile firing sound

Collision (missile hitting object)

Death sound effect

UFO

Sounds overlapping

Additional Material

Anything I should Know:

Verify Builds

- Follow the Piazza procedure on submission
    - Verify your submission compiles and works at the changelist number.
- Verify that only MINIMUM files are submitted
    - No – Generated files
        - *.pdb, *.suo, *.sdf, *.user, *.obj, *.exe, *.log, *.pdb, *.db, *.user
        - Anything that is generated by the compiler should not be included
    - No – Generated directories
        - /Debug, /Release, /Log, /ipch, /.vs
- Typical files project files that are required
    - *.sln, *.csproj, *.cs,
    - App.config, AssemblyInfo.cs, CleanMe.bat
    - Resources Directory:
        - *.tga, *.dll, *.wav, *.glsl, *.azul

Standard Rules

Submit multiple times to Perforce
- Submit your work as you go to perforce several times (more than 20 submissions)
    - As soon as you get something working, submit to perforce
    - Have reasonable check-in comments
        - Points will be deducted if minimum is not reached

Submission Report
- Fill out the submission Report
    - No report, no grade

Code and project needs to compile and run
- Make sure that your program compiles and runs
    - Warning level 4
    - NO Warnings or ERRORS
        - Your code should be squeaky clean.
    - Code needs to work "as-is".
        - No modifications to files or deleting files necessary to compile or run.
    - All your code must compile from perforce with no modifications.
        - Otherwise it's a 0, no exceptions

Project needs to run to completion

- If it crashes for any reason...
    - It will not be graded and you get a 0

No Containers

- o Containers (No automatic containers or arrays
- o Template or generic parameters
- o ***No arrays***
  - o You need to do this the old fashion way - ***YOU EARNED IT***
  - o Exception – ***Gylphs*** for fonts

Leave Project Settings

- Do NOT change the project or warning level
  - o Any changing of level or suppression of warnings is an integrity issue

Simple C#

- No .Net
- We are using the basics
  - o Types:
    - Class, Structs, intrinsic types (int, float, bool, etc…)
  - o Basics language features
    - Inheritance, methods, abstract, virtual, etc…
  - o See Piazza C# Illegal List

No Debug code or files disabled

- Make sure the program has only active code
  - o If you added debug code or commented out code,
    - please return to code to active state or remove it

Adding files to this project

- Make sure you add the files in the appropriate sub-directories
- Make sure any new files are successfully integrated into the project
- Make sure your new files are submitted to Perforce

Details

Due Dates

- Final Drop
  - Sunday - March 19 by 11:59pm CST
    - Final drop of your game in Perforce
      - Code + Video
      - Submission Report
    - Design Document
    - Turn in PDF to perforce
- Any questions?
  - Please ask questions to clarify any items you do not understand.
  - By NOT asking questions
    - I assume that you understand and are following the procedures correctly.
    - So please ask.

Video Capture

- Video
  - Need a 10-20 minute video demo of your project (20 min MAX)
    - Show case the features you completed
    - Demo and add commentary of your project
    - This is to show case your work
      - Be honest with what is working and not working
  - Post video to YouTube
    - Use any video capture tool you
      - Many free ones
      - Start discussion thread on options
    - ***Link to movie inside the paper document***
    - ***Link to movie in your submission pdf***
  - Do not record the whole desktop
    - Restrict your recording to the area of interest
      - Code editor to show code
      - Window to show working demo
      - Saves space on movie
  - Audio
    - Test your audio
      - Make sure it is loud enough and easy to understand
    - Don't be nervous,
      - Everyone is awkward and weird in their own unique way

- You listen to me, that's strange and goofy

- What to capture?
  - Demo the game to show off the features that you have complete
    - Look at the specification below
      - Highlight as many things as you can demonstrate
      - ***If you don't demonstrate the feature.. you don't get points***
      - These videos can be shared amongst the class
        - Be proud, you've done a great job!
    - For example,
      - Start the game from the select screen
      - Play several levels.
      - Die a few times
      - Update the high score
      - Return to the select screen and start again
    - After showing every feature.
      - Quickly show each design pattern (UML + code)
      - I need to hear you explain in 20 seconds each pattern.
        - Quick and dirty – key point that makes the pattern

Submission Report – Feature List

- Feature list is located in the submission report
  - Communicated the features completed / not completed from the report
    - see below for feature list
  - Link to the YouTube video

Documentation

- Engineering Design Documentation
  - Arrangement of design document (like a book)
    - Overall design / High level view
    - Problem / Component Discussions
      - Should discuss every Design Pattern used in detail
      - ***Minimum of 10 design patterns*** (must match YOUR code)
        - Required patterns that must be documented
          - See check list on 1st page
    - Post-Mortem
      - Improvements, Commentary
  - Design Pattern
    - UML (1/2 – 2/3 page)
      - Using the diagram tool from Visual studio – no reference UML or external tools
      - Needs to be your code not a reference
    - General:
      - What is the design pattern?
      - Intention of the pattern

- How does it work (Object oriented mechanics)
  - Discussion
    - Discussion of the problem you are trying to solve
      - How is a specific design pattern being used?
      - Why is the pattern better than other common coding solution?
        - Contrast this pattern solution to non-design pattern solution
    - Descriptions of the interactions between other components
    - Discussion of trade-offs or problems you overcome
  - In general UML diagrams
    - Structural class diagrams are suffice (use visual studio for diagram – easiest)
  - How do you know if your wrote enough
    - This report should give:
      - A good understand of what you did
      - Impress a future employer
    - Should be clear that you are a Software Architect
  - Page length Expectations
    - 20-30 pages in PDF format
      - Don't freak - UML diagrams take space
- Format
  - pdf format ONLY – please *NO* Word, Write, Google docs

Game Specification

This is the game specification that I'm using to evaluate your completed game. The goal is to have this game as close to the arcade version as possible, using design patterns and modern software architecture design philosophy. I'm using these videos as benchmarks to the original arcade version. When in doubt please refer back to these videos.

- Arcade Reference:
  - Best overall video
    - https://www.youtube.com/watch?v=VP2T3YlTDG8&feature=related
  - Additional game play
    - See the select screen (ignore or mute the commentary)
      - https://www.youtube.com/watch?v=eHMxQUoKxDw&feature=related
    - Good end of game screens (ignore or mute the commentary)
      - https://www.youtube.com/watch?v=aZAfWGEN3bw&NR=1
  - High resolution
    - https://www.youtube.com/watch?v=iY1KTlKNE3M

Game Specification

- **Stand alone game application**
  - Create an game Application
    - Supply all
      - Art assets
      - Sound assets
      - Source and project Code
  - Doesn't build or work – 0 for the coding project (YES -you fail the class)

- **Select Screen**
  - Instructions
  - High score
  - Points for each type of alien
  - 1 or 2 player selection
  - Credits (optional)

- **Game Cycle**
  - Game goes through the following cycles:
    - Select Screen
      - Instructions/points for each type of player
    - Select 1 or 2 player
  - Enter Game
    - Play game until player dies 3 times
    - Cycling between player 1 and player 2
      - If in 2 player mode
  - Game over screen
    - Update high score if it's a new high score
  - Select screen
    - Return to this screen

- **Game should be able to**
  - Complete at least 2 levels
  - Each level should get progressively harder
    - Initial states:
      - Alien grid position lower to the ground than previous level
      - Alien rate faster than previous level

- **Score**
  - Points are added as the player kills aliens or UFOs
  - High score is updated at the End of Game
    - If it's a new high score displacing the old one.
  - Individual Scores for each player displayed at top of screen

- **Player**
  - Display player icon / sprite
  - Movement
    - Keyboard
      - Right/Left keys
      - Fire missiles (space bar)
  - Number of lives
    - Initialized with 3 lives
    - Decays as player loses a life
    - Game over if last life dies
  - Launches one missile at a time
    - Ready to fire / re-fire only when the missile has a collision
  - Collision:
    - Missile hits shield
    - Missile hits Alien
    - Missile hits top of screen boundary
    - Missile hits UFO
    - Missile hits Alien Bomb
  - Sound effect on missile launch

- **Alien Grid**
  - Initialized in an 5x11 grid
    - Top row – squid
    - Middle 2 rows – crab
    - Bottom 2 rows – octopus
  - Grid moves horizontally right or left to screen edge
  - Grid moves down when it hits the screen edge and changes horizontal directions
  - Animated movement
    - Alien Sprites cycle between 2 images
    - Animation happens in unison
  - Speed increases as the number of sprites decrease
  - Aliens drop bombs randomly
    - Aliens can drop more than one bomb at a time
      - From the bottom Alien column
    - Individual aliens can re-launch bombs
      - If their respective bomb hits a shield, player's missile, or ground
    - 3 different types of bombs
      - Zigzag
      - Dagger
      - Rolling
    - Aliens can be destroyed by player's missile
      - Resulting collision – deletes alien sprite
      - Animation effect of the death
        - Points awarded
  - Deleted aliens affect the grid movement
    - When the outside column of aliens are destroyed,
      - the movement of the grid has greater range in the horizontal direction
  - Alien collision with player's missile can happen from the side as well as vertically
    - Aliens can effectively move horizontal into a player's missile
  - Killed aliens had the respective points to the player's score

- **UFO**
    - Launches at random intervals
    - Moves horizontally at top of screen in the right or left direction
    - Launches one bomb at a time
        - Similar to the aliens
        - Until a collision happens
        - Bomb sometimes looks like a tuning fork
    - When flying, unique sounds play while the UFO is on the screen
        - Sound loops while UFO is on screen
            - Very annoying/stressful effect
    - Explosion sprite animation when the UFO is killed
    - Player score is updated with the appropriate points

- **Missile / Bombs**
    - Can only launched one at time from their respective player, alien or UFO
        - Animated effect as it is moving
    - Missiles and Bombs can hit and kill each other
    - Bombs dropping
        - 3 different Modes - see thread on missile falling
            - Zig-Zag
            - Dagger
            - Rolling
        - You must show at least 3 different types of bombs

- **Shields**
    - 4 shields on the screen
    - Shields can impede player's missiles from traveling towards aliens
    - Shields can protect player from alien bombs
    - A hole can be effectively "drilled" through the Shield
        - Allowing alien or UFO's bombs or player's missiles to pass unimpeded
    - Multiple hits creates a holes in shield
        - Test creating a through hole on the edges of the shields
        - Test creating a through hole in the middle region of the shield
    - Shields can be 100% completely dissolved by combination of missiles and bombs
        - Allowing missile or bombs to fly through unimpeded
    - Graphical effects
        - Erosion of the shield should "appear" to have dissolve effect
        - Pseudo random dissolve effect

- **Sounds**
    - Audio of the aliens marching
        - Lock step with the alien movement
        - Cycles through 4 sound effects
        - Goes faster as the aliens go faster
    - Types of sounds
        - Missile firing
        - Collisions (missile hitting objects)
        - Death sound effects
        - UFO
    - Sounds can be overlapping