

COMPUTER GAME DESIGN

A course in programming for computer game design using Adobe Flash

Fairport High School
Technology Department

- Q. Why is Adobe Flash important to high school graduates' preparedness for the job market or post secondary education in the field of Information Technology?
- A. Adobe Flash is now, arguably, the most widely distributed and most platform independent plugin architecture for multimedia playback available today. The Flash Player is installed on many devices when they leave the factory, from PCs and Macs, through PDAs, Mobile Phones and Set-top TV decoders - it is even used to provide interfaces to equipment like home security panels and similar products. Adobe Flash has the ability to display a wide range of media (e.g. text, vector images, bitmap images, sound, video, etc), to then programmatically manipulate that media, to dynamically generate new media and to link to people, databases or services run elsewhere on a network.

Computer programming is the process of writing, testing, debugging/troubleshooting, and maintaining the source code of computer programs, and in particular in this course, computer animations, movies, and games. This source code is written in a programming language. The code may be a modification of an existing source or something completely new. The purpose of programming is to create a program that exhibits a certain desired behavior. The process of writing source code in general requires expertise in many different subjects, including knowledge of the application domain, specialized algorithms and formal logic. ActionScript 3.0 will enable students to learn and create using a unique programming language not already taught in any other course at Fairport. The ActionScript 3.0 scripting language lets you add complex interactivity, playback control, and data display to various applications.

Course Information

Target audience: *Anyone wishing to learn programming to create computer/video games.*

Credit: *1/2 unit*

Time: *One Semester*

Exam: *Departmental/Project Based*

Prerequisite: *None*

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Course Description

The last decade has seen unprecedented innovation in technologies for communication, computation, interactivity, delivery of information, education, and entertainment. New Web based media such as online games, Web 2.0 applications, dynamic and personalized Web sites have become pervasive throughout the digital world. Students in CGD101 will be provided with a well balanced background in programming, design, and technology with an emphasis on independent problem solving in a constantly evolving field. Students will learn the fundamental concepts of game programming. Learning programming in Flash and ActionScript will provide students with a solid platform for creating web-based games, video animations, and movies. Students will write scripts to implement navigational strategies and control the display of graphics, text, audio and video. This course is designed to present the skills and to provide the hands-on experience required to create computer games. Students will employ the fundamental structures of computer programming such as loops, variables, parameters and functions in their scripts.

Grading Policy

1st Quarter Grade:

| | |
|----------------|-----|
| CGD Flash Labs | 40% |
| CGD Projects | 40% |
| Quizzes/Tests | 20% |

2nd Quarter Grade:

| | |
|----------------|-----|
| CGD Flash Labs | 40% |
| CGD Projects | 40% |
| Quizzes/Tests | 20% |

Final Grade:

| | |
|--------------------------|-----|
| 3 rd Quarter: | 40% |
| 4 th Quarter: | 40% |
| Final Project: | 20% |

Adobe Flash CS5

What is Flash?

- Authoring program that creates *interactive multimedia files*, called *movies* in Flash
- Animation sequencer - uses a series of frames and a sequence of scenes to make its movies. Each frame of the movie can have one or more elements that can change size, position, and color from previous frame to create animation effect.
- Vector-based drawing program - draws pictures on screen using points with specific coordinate values (vectors) to define curves. Vectors that connect together in a sequence describe a path.
 - Different from bitmaps -- if you enlarge a bitmapped graphic, the pixels are enlarged and image may become pixilated (jagged). If you enlarge a vector graphic, the pixels are recalculated every time the image is rendered on the screen
 - Vector based drawing is faster because it only renders bitmapped images when they are needed from mathematical equations that are smaller to store than bitmap information about pixels.
 - Flash vector drawing will also straighten out your lines or draw true circles.
- **Video**
 - tools for adding interactivity to video clips
 - **Video** encoder creates streaming FLV video files & provides skins. Video streams progressively
 - Export to QuickTime movies, including movieclips and other run-time effects.
 - Export to compressed SWF files with exceptional compressor--yields small files with high quality.
- Import and export **MP3 audio files**
 - MP3 provides high audio quality and smaller file size
 - loop audio clips
- **ActionScript 3.0**
 - scalable for beginners to advanced programmers
 - generate ActionScript from animation on screen to save for reuse
- **Component improvements**
 - non-compiled components available which let you modify the look, color, skins, shape of the component
 - compiled components also available

Flash uses Symbols

- Symbol characteristics can be changed during movie
- An image or a sound file that is stored as a symbol only downloads one time in the first key frame in which it appears.
- Rest of information about changes to file is in vectors that describe changes.
- Sound files are often looped and played over and over again - MP3 compression provides good sound and small sound file size.
- If you don't store image as a symbol, it has to be downloaded each time it is used!

In Flash you can edit symbols from

- within the movie, where you can see the immediate effects
- in a new window in which you can see the changes to the symbol on the stage
- in the traditional symbol-editing window
- changing a Flash symbol changes all instances of the symbol within the movie

Flash Movies and their Parts

can be saved:

- As Flash (.fla) documents
- Played inside Flash
- Have to be exported as SWF files to play on the Web or in a Flash Player

Exported as SWF movies

- play on HTML pages on the web
- Play in Flash Player
- Both video and audio content compressed

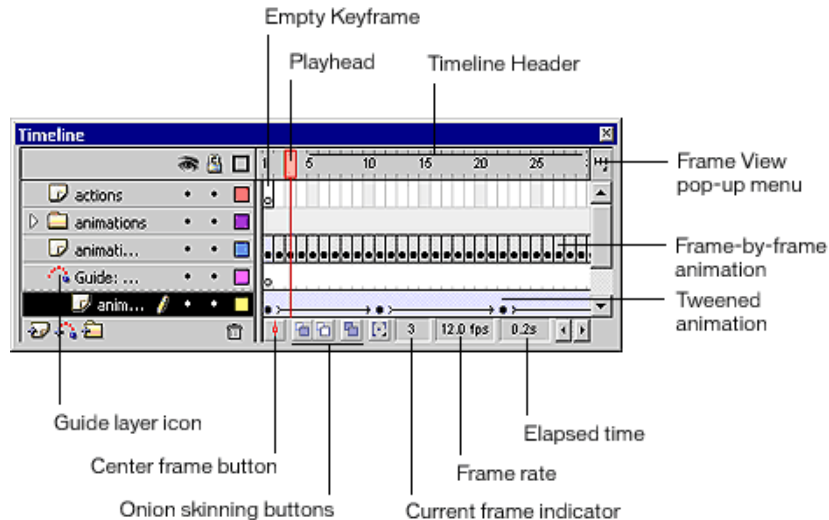
Other export formats:

- QuickTime digital video (MOV) files
- Animated GIFS (without the sound)
- AVI files, but tend to be large file size.
- Individual frames can be exported as bitmap images (e.g., jpg, gif, bmp). During export, can compress bitmaps with JPEG compression

Sound files without video

- default is .MP3,
- MP3, aif & .wav files can be imported into Flash

Movies are made up of layers in a Timeline:



Layers are arranged from front to back -- top layer is in front

To keep track of content, as a general rule of thumb:

- create a new layer for each object
- Drawn objects that touch one another will become grouped automatically into one object. When separated, you lose part of the image
- give each layer a meaningful name.
 - When there are more than a few layers, it is much easier to edit movie if you know what is in each layer
- Create a separate layer for ActionScripts
- Flash lets you create folders in the timeline to organize layers of different types -- easier layer management.
- Good practice to **lock layers** you are not working on to prevent accidental changes to objects on it.