XNA

CSCI 4448/6448 — Fall 2008
Object-Oriented Analysis & Design

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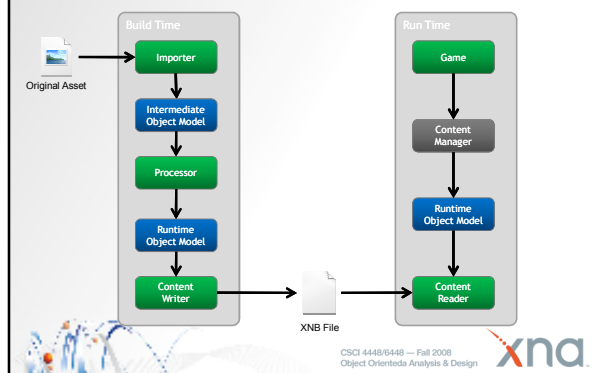Microsoft

"XNA's Not Acronymed"

- Set of tools to manage Game Development
- Includes a managed Runtime Environment
- Aims to remove repetitive "boiler plate code"
  - Largely facilitated through the content pipeline and runtime enviroment
- Based off .NET Framework 2.0
  - Runtimes available for Windows XP, Vista, Xbox360, and Zune

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Content Pipeline Flow

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Content Importer and Processor

- Content Importer
  - Brings in raw assets and converts to common types
  - Normilization work is done here
  - Supports many-to-one importing & blind data
- Processor
  - Translates content DOM to run-time object
  - Makes no assumptions about input (strictly typed)

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Content Writers and Readers

- ContentWriter
  - Serializes the run-time types to a stream
  - Associated with the run-time types
  - Indicates what ContentReader to use
- ContentReader
  - Deserializes the run-time types
  - Invoked by ContentManager.Load<T>
- Only need to create these if you're extending the content DOM

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3D Graphics

- Basic Initialization is taken care of
- Lots of tutorials, docs, community help
- Loading 3D Models is very easy
  - Built-in support for Autodesk FBX format
  - myModel = Content.Load<Model>(modelName);
- Displaying model is more complicated
  - Does not completely succeed at reducing "boilerplate" code

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Draw a Model

```
protected override void Draw(GameTime gameTime)
{
        graphics.GraphicsDevice.Clear(Color.Black);

        Matrix[] transforms = new Matrix[myModel.Bones.Count];
        myModel.CopyAbsoluteBoneTransformsTo(transforms);

        foreach (ModelMesh mesh in myModel.Meshes)
        {
                foreach (BasicEffect effect in mesh.Effects)
                {
                        effect.EnableDefaultLighting();
                        effect.World = transforms[mesh.ParentBone.Index];
                        effect.View = Matrix.CreateLookAt(Vector.Zero, Vector3.Forward, Vector3.Up);
                        effect.Projection =
        Matrix.CreatePerspectiveFieldOfView(MathHelper.ToRadians(55.0f), aspectRatio, 0.1f, 1000.0f);
                }
                mesh.Draw();
        }
}
```
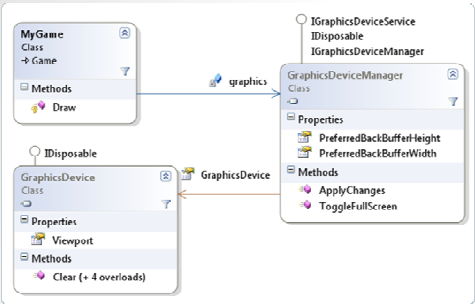
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Basic Graphics

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Audio

- Very Easy to add Audio to an XNA Project
- Two Methods:
  - Use SoundEffect and Song Classes
    - Very easy to add simple music and sound.
    - Uses only a few lines of code
    - Only way to add audio on the Zune
  - Create XACT File
    - Slightly more complicated but helps organization
    - Requires using more audio objects

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Adding Simple Audio

```
// Create a song object for mp3 songs and SoundEffect object for audio effects in .wav format.
SoundEffect honk;
Song imperialMarch;
protected override void LoadContent()
{
        ..
        // honk.wav has been loading in as content.  Do not need the .wav in reference to file.
        honk = Content.Load<SoundEffect>("honk");
        // impmarch.mp3 has been loading in as content.  Do not need the .mp3 in reference to file.
        imperialMarch  = Content.Load<Song>("impmarch");
        // Tell the XNA MediaPlayer to play the song loaded into the imperialMarch song object.
        MediaPlayer.Play(imperialMarch);
}
// Wherever you want to play the sound effect you can just call the Play() method of the Song object.
honk.Play();

// Can also call the Play method with these parameters.
public SoundEffectInstance Play ( float volume, float pitch, float pan, bool loop )
```
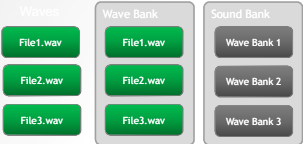
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XACT

- Creating XACT Files is the Standard Way to Add Audio to an XNA Project
- Using the XACT GUI you Combine groups of Wave Files to make Wave Banks and Groups of Wave Banks to make Sound Banks

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XACT Continued

```
// This method requires more audio objects.
AudioEngine engine;
SoundBank soundBank;
WaveBank waveBank;
Cue cue;
protected override void Initialize()
{
        ..
        // Initialize audio objects.
        engine = new AudioEngine("Content\\Audio\\Sound1.xgs");
        soundBank = new SoundBank(engine, "Content\\Audio\\Sound Bank.xsb");
        waveBank = new WaveBank(engine, "Content\\Audio\\Wave Bank.xwb");        // Play the sound.
        cue = soundBank.GetCue("imperialMarch");
        // or the following to set the cue to the honk wave
        // cue = soundBank.GetCue("honk");
        cue.Play();

}
```

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Input

- Mouse, Keyboard
  - State
  - Position

- Game Controller
  - Functionality
  - State
  - Motor Speed

Media

- Music control for Microsoft Zune
- MediaLibrary
  - Collections of Songs, Genres, Albums, Artists, etc.
- MediaPlayer
  - Start/Stop
  - Previous/Next
  - Volume

Net

- NetSession
  - Create, Join network games
  - Get individual gamer information
    - Host, status, controller properties

- PacketReader/PacketWriter
  - Handle network data

demo

Creating a Our Own "Game"