

TRAINER PREPARATION GUIDE 3.1: UNDERSTAND RENDERING ENGINES

Lesson Objective 3.1:

Understand rendering engines. *Topics:* DirectX®, video and audio compression, and resolution (full screen, VSync, and windowed).

Required materials to teach this lesson:

1. A workstation with Windows 7®, Windows Vista®, or Windows XP®
2. Microsoft Visual Studio® or Microsoft Visual C# Express® (2008 or 2010)
3. XNA® Game Studio 2.0, 3.0, 3.1, or 4.0
4. Internet connectivity
5. DirectX 10: <http://msdn.microsoft.com/en-us/directx/default.aspx>
6. 98-374-ENU-3.1-LP
7. 98-374-ENU-3.1-IC
8. 98-374-ENU-3.1-IC_Key
9. 98-374-ENU-3.1-PC

Preparation Tasks

Technical preparation activities:

1. Install DirectX 10.0 (<http://msdn.microsoft.com/en-us/directx/default.aspx>) on student computers.
2. Review and complete the tutorial to be sure that you have the computers set up correctly and you can respond to any student questions as they go through the tutorial.

Special Notes: Please note the following issues with Windows Phone SDK 7.1:

- Despite downloading the International Organization for Standardization (ISO) version of the software development kit (SDK), the student may still need to register the SDK online.
- As you try the samples found at [msdn.microsoft.com/en-us/library/dd368187 \(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/dd368187(v=VS.85).aspx), please note the following:
 - You may need to rebuild solutions when error comes up when you run the programs; also, you may need to go through a conversion process.
 - There are directions on how to “build against the x64 platform.” Please note that this technique does not work for SDK 7.1 because it is deprecated in Windows Phone® SDK 7.1.
- The following hyperlinks to samples do not work at the above-referenced Uniform Resource Location (URL) for SDK 7.1:
 - Direct 3D Interop
 - MSAA Rendering
 - SaveAs ImageFileSample

3. **Vocabulary:**

application programming interface (API): a set of rules and specifications that software programs can follow to communicate with each other.

codec: a device or software that is used to encode or decode (compress or decompress) a digital media file.

DirectX: a collection of APIs from Microsoft® for handling tasks related to multimedia, especially programming games and high-performance multimedia applications, including 2-D and 3-D graphics.

game engine: a software system designed for the creation and development of video games such as XNA.

rendering engine: software or hardware that converts specifications for images into pixels.

tearing: occurs when VSync is disabled and the graphics card and monitor rates have different refresh rates. There appears to be a line separating two halves when this occurs.

VSynC: stands for "vertical synchronization"; used to synchronize the graphics card with the output on the monitor.

4. **Additional readings and resources:**

MSDN:

DirectX Developer Center: <http://msdn.microsoft.com/en-us/directx/default.aspx>

DirectX Samples: [http://msdn.microsoft.com/en-us/library/dd368187\(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/dd368187(v=VS.85).aspx)

QuickStart, a basic DirectX app: [http://msdn.microsoft.com/en-us/library/br229585\(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/br229585(v=VS.85).aspx)

Windows Media Codecs: [http://msdn.microsoft.com/en-us/library/ff819508\(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ff819508(v=VS.85).aspx)

Introduction to DirectX: <http://channel9.msdn.com/coding4fun/articles/Beginning-Game-Development-Part-II-Introduction-to-DirectX>

Audio Compression Using XACT: <http://blogs.msdn.com/b/mitchw/archive/2007/04/27/audio-compression-using-xact.aspx>

Other resources (books, e-reference):

Codecs: frequently asked questions: <http://windows.microsoft.com/en-US/windows7/Codecs-frequently-asked-questions>

The Gamer's Graphics & Display Settings Guide Graphics Settings Vertical Synchronization: http://www.tweakguides.com/Graphics_9.html

DirectX Tutorial for C#: <http://www.riemers.net/eng/Tutorials/DirectX/Csharp/Series1/tut1.php>

Instructor computer setup:

1. Install DirectX and Visual Studio 2010 on all computers that will be used.

Instructional preparation activities:

1. Review Lesson 3.1 documents.
2. Make copies of student documents available as needed.

3. Review and complete the tutorial to be sure that you have the computers set up correctly and to be sure you can respond to any student questions.

Lesson Sequence (50 minutes)

Activating prior knowledge/lesson staging (5 minutes):

Direct students to answer each question in the “Guiding questions” section of the In-class Activity document or their personal class notes.

Guiding questions:

1. **What is DirectX and how do you use it?** DirectX is a collection of APIs from Microsoft® for handling tasks related to multimedia, especially programming games and high-performance multimedia applications, including 2-D and 3-D graphics.
2. **How can audio and video be compressed?** Audio and video can be compressed with codecs, which is software used to compress audio and video. Windows Media Player, which copies a song from a CD and makes it playable on your computer, is an example of a codec.
3. **When is VSync used?** VSync, which stands for vertical synchronization, is used to synchronize the frames per second with the monitor’s refresh rate to prevent tearing.

Lesson activity (40 minutes):

1. Teacher instruction (15 minutes)
Use the included Microsoft PowerPoint® presentation to review the topic of rendering engines.
2. In-class activity (20 minutes)
Students are to complete the In-class Activity document 98-374-ENU-3.1-IC.
3. Post-class activity (5 minutes)
Provide instruction for the Post-class activity as needed. Establish a completion date.

Lesson review (5 minutes):

1. Discuss the guiding questions.
2. Instruct students to write and submit any questions they have or any topics about which they would like more assistance.
3. After class, look through the student responses and follow up with any student requiring additional help.