

TRAINER PREPARATION GUIDE 2.4: MANAGE GAME PERFORMANCE

Lesson Objective 2.4:

Manage game performance. *Topics:* CPU vs. GPU, Reach vs. HiDef, graphics networking performance

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. 98-374-ENU-2.4-LP
6. 98-374-ENU-2.4-IC
7. 98-374-ENU-2.4-IC_Key
8. 98-374-ENU-2.4-PC

Preparation Tasks

Technical preparation activities:

1. Install Visual Studio Express C# and XNA
2. Windows XP users: Download Visual C# 2010 Express and XNA Game Studio 4.0 separately at App Hub (<http://create.msdn.com/en-US/>).
3. **Vocabulary:**

central processing unit (CPU): the computational and control unit of a computer.

frame rate: the number of times per second an image is updated; measured in frames per second.

graphic processing unit (GPU): a single-chip processor that renders 2-D and 3-D graphics and videos.

HiDef: a profile used for higher-performance computers with at least DirectX 10® and the Xbox 360® because of advanced graphics capabilities.

parallel processing: a method of processing that can run only on a computer that contains two or more processors running simultaneously.

profile: a feature set that is implemented in hardware.

Reach: a profile used most often for limited hardware capabilities. Reach is the default profile used for the Windows Phone® and can be used for Microsoft Windows®-based computers and the Xbox 360.

shader: a computer program that controls how the image will look on the screen.

transistor: a three-terminal semiconductor amplifying device, the fundamental component of most active electronic circuits, including digital electronics. The transistor was invented in 1947 at Bell Labs.

4. Additional readings and resources:

MSDN®:

How to tell if you are CPU or GPU bound:

<http://blogs.msdn.com/b/shawnhar/archive/2008/04/07/how-to-tell-if-you-are-cpu-or-gpu-bound.aspx>

Reach vs. HiDef: <http://blogs.msdn.com/b/shawnhar/archive/2010/03/12/reach-vs-hidef.aspx>

Selecting Reach vs. HiDef: <http://blogs.msdn.com/b/shawnhar/archive/2010/07/19/selecting-reach-vs-hidef.aspx>

What is a Profile?: <http://msdn.microsoft.com/en-us/library/ff604995.aspx>

Other resources (books, e-reference):

Difference Between CPU and GPU: <http://www.differencebetween.net/technology/difference-between-cpu-and-gpu/>

GPU vs. CPU Performance Video: <http://www.youtube.com/watch?v=eH96JE-CnHw&feature=related>

How Graphics Cards Work: <http://computer.howstuffworks.com/graphics-card.htm>

How Xbox 360 Works: <http://electronics.howstuffworks.com/xbox-three-sixty.htm>

Instructor computer setup:

1. Microsoft PowerPoint® with projection system and access to the Internet.

Instructional preparation activities:

1. Review the Lesson 2.4 documents.
2. Be prepared to show the CPU vs. GPU video.
3. Be prepared to demonstrate selecting the XNA profile using Visual Studio®, as indicated in the presentation.

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 in their personal class notes.

Guiding questions:

1. **What are the differences between CPU and GPU?** The major difference between a central processing unit (CPU) and a graphics processing unit (GPU) is that a CPU is capable of running many different applications, while a GPU is specifically designed for graphics processing. A GPU can process faster than a CPU.
2. **What determines if a designer uses a Reach or a HiDef profile?** The Reach profile is used most often for Windows Phone and lower-end computers. A HiDef profile is used most often for higher-performance Windows-based computers and the Xbox 360.

Lesson activity (40 minutes):

1. Teacher instruction (15 minutes)
 - Use the included PowerPoint presentation to review CPU vs. GPU, Reach vs. HiDef, and Graphics Networking Performance.
 - Show the GPU vs. CPU Performance Video: <http://www.youtube.com/watch?v=eH96JE-CnHw&feature=related>.
 - Lead a class discussion about the differences between CPU and GPU, as illustrated in the video.

In-class activity (20 minutes):

1. Students are to read the following articles and complete the 98-374-ENU-2.3-IC document:
 - Difference Between CPU and GPU: <http://www.differencebetween.net/technology/difference-between-cpu-and-gpu/>
 - How Graphics Cards Work: <http://computer.howstuffworks.com/graphics-card.htm>
 - How Xbox 360 Works: <http://electronics.howstuffworks.com/xbox-three-sixty.htm>

Post-class activity (5 minutes):

1. 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.
4. Provide the Post-class Activity document for additional review.