

Instructor-Based Training



Course Manual

Jeffrey Travis Studios

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Course Description

This class gives a broad, intensive overview of all the major current Internet technologies available in a client/server or distributed computing application written in LabVIEW. The focus is specifically on using the technologies with LabVIEW as the core programming language for virtual instrumentation design. Topics such as TCP/IP, XML, Java, ActiveX and more are presented. We also discuss LabVIEW's latest features for Internet productivity such as DataSocket, Web publishing, VI server, and more. All of the material can be applied not just to the Internet, but to any TCP/IP network (e.g., a corporate Intranet).

Pre-requisites

Students must have a basic understanding of LabVIEW programming (e.g., "LabVIEW Basics I and II" or equivalent). They should know how to use LabVIEW and build simple VIs to get the most out of this course. On the other hand, almost no assumptions are made about their familiarity with Internet technologies. All that is required beforehand is that they can use e-mail and know how to browse the Web. All relevant topics are presented in a concise manner, giving the students the opportunity to explore more on their own.

Course Duration

3 days (10 lessons)

Cost and Locations

Please contact Jeffrey Travis at course@jeffreytravis.com phone/fax (208)-293-9072 for a quote on course costs. The course can be offered on-site at your company, or off-site, depending on your preference.

Course Materials Provided

1. Textbook for course: "*Internet Applications in LabVIEW*" by Jeffrey Travis (Prentice-Hall, 2000)
2. Course slides and handouts (ring-bound)
3. CD with demo, free software and exercise solutions

Software

At each student station (machines running Windows 95,98 or NT), this software will be provided on the CD as needed.

1. LabVIEW 6i
2. Internet Toolkit for LabVIEW
3. ComponentWorks (evaluation version)
4. DataSocket
5. Netscape Navigator
6. Internet Explorer
7. Visual Basic 5.0 CCE

All student machines should be networked on a LAN, preferably with a gateway to the Internet. The instructor's machine must also be networked.

Course Structure

Each lesson will not only consist of visual slides, but of 1-3 exercises per lesson. An example of an exercise is shown in italics for each lesson in the outline below. The students will create exercises that build upon each other as they progress through the course. For example, in Lesson 3, the students learn how to set up a Web server and write an HTML page. This HTML page is used later in the course when they add live VI images and a Java applet that communicates with DataSocket to VIs they write.

Because all the students workstations will be networked, in some exercises students will team up to run networked applications, providing a higher level of interactivity than with ordinary courses.

PART ONE: Internet Technologies, Protocols, and Applications

Lesson 1

Introduction

Course Layout
Virtual Instrumentation and the Internet
The four types of network-enabled systems:
Remote monitoring, remote control, collaboration, distributed computing
Real-world applications and demo of each of the above
Product and tools available

Lesson 2

Internet Technologies: Basic Principles

Internet keywords and buzzwords
Networks and client-server models
Network Protocols: TCP/IP, UDP
Understanding your network configuration: IP addresses, DNS, gateways, subnet masks
High-level network protocols and applications: E-mail, FTP, Telnet, HTTP

Lesson 3

Internet Technologies: Interfacing to the Web

Web browsers and servers
HTTP

HTML: overview, editors

XML

Related technologies: JavaScript, ASP, DHTML, XML, Plug-ins

The Wireless Web: WAP, WML, WMLScript

Lesson 4

Internet Technologies: Interacting with the Web

CGI: forms, imagemaps

Java: applications, applets, JavaBeans

ActiveX controls

PART TWO: Integrating LabVIEW and Internet Technologies

Lesson 5

Low-level networking with LabVIEW: TCP/IP and UDP

TCP/IP, UDP VIs

Client -Server applications

RDA server for NI-DAQ

Lesson 6

Object-oriented networking with LabVIEW: VI Server

VI Server concepts

Application Classes, VI Classes, Control Class

Properties and Methods of Application Class

Properties and Methods of VI Class

Properties and Methods of Control Class

Dynamic VI calling

Lesson 7

High-level networking with LabVIEW: DataSocket

DataSocket protocol (dstp)

DataSocket server

DataSocket connections to LabVIEW controls

The DataSocket VIs

Lesson 8

Monitoring LabVIEW on the Web

G Web server

Dynamic Web files created with G Web server or Internet Toolkit

Custom HTML file creation from LabVIEW with the VI Server and Internet Toolkit
The LabVIEW Player

Lesson 9

Controlling LabVIEW over the Web

9A: CGI (Internet Toolkit VIs)
9B: Java applets with DataSocket
9C: ActiveX controls with DataSocket

Lesson 10

Design Considerations for Internet-enabled applications

Choosing the right solution
Client/Server Design
Throughput, performance, robustness

Appendix A
HTML mini-reference

Appendix B
DataSocket API reference

Appendix C
Security in LabVIEW-Internet applications

For more information, contact

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