Technical Education Services Course Specification

Course Number: RH3050

Course Title: iHawk System Installation and Configuration

Course Duration: 2 Days

Purpose:

The iHawk™ Series is Concurrent Real-Time's high-performance PCIe-based computer platform for real-time data acquisition, simulation, and industrial systems applications. Installation and configuration of the RedHawk Linux kernel, associated file systems, development tools, utilities, and supported software requires judicious planning and execution. The primary goal of this intensive two-day hands-on training session is to provide the student with the knowledge and skills to install and configure system level software and configure the system for both development and operational deployment.

Intended Audience:

This course is intended for both software engineers and system administrators that are tasked with the operation and management of Concurrent iHawk computer systems running the RedHawk Linux kernel, NightStar Tools, and SIMulation Workbench.

Course Objectives:

Upon successful completion of this course students are able to:

- Describe system hardware requirements and configure the BIOS for Concurrent Real-Time Linux installation.
- Identify the media and ordering of software installation to include Concurrent Real-Time optional software such as NightStar Tools and SIMulation Workbench.
- Using Anaconda, configure disc devices and file systems, select appropriate software packages, configure networking and user accounts, and install the base Linux distribution.
- Describe the GRUB configuration file and use various tools and techniques to override the default boot sequence.
- Describe the Linux kernel boot process and using systemctl configure system services
- Describe the functions available with NUU, yum, and the structure of the Concurrent Real-Time software repositories.
- Configure PAM (Pluggable Authentication Module) to support non-root NightStar Tools users.
- Configure, build, install, and boot a custom RedHawk Linux kernel.
- Install, update, and license NightStar Tools and SIMulation Workbench.

Prerequisites:

- BS degree in computer science or equivalent in web technology, network administration or something similar.
- Basic knowledge of Linux, including installing Linux and using the command line is helpful but not required.

Course Topic Outline:

I. History and Background of Linux
   A. UNIX & MINIX
   B. Linux and GNU GPL
   C. Major Linux Distributions and Timelines

II. iHawk Hardware Architecture
   A. X86 Processors, Cores, and Caches
   B. Basic Multi-Core NUMA System Architecture
   C. PCIe Busses and I/O Devices
   D. Network Interfaces
   E. SATA Controllers and Peripheral Devices
   F. Graphics Cards and GPUs
   G. BIOS Settings for Concurrent Real-Time iHawk Platforms

III. RedHawk Linux Installation Processes
   A. Booting and Installing the Base Linux Distribution
   B. Software Repositories and Updates
   C. RedHawk Linux Installation and PAM Configuration
   D. Optional Concurrent Real-Time Software Installation & Licensing

IV. Linux Hierarchical File System
   A. Partitions and Mount Points
   B. Configuration Files and Permissions

V. Red Hat Package Management
   A. Software Packaging Concepts
   B. Package Installers
   C. Repositories and Configuration

VI. Linux Filesystems
   A. File System Basics
   B. Partitions and LVM
   C. XFS, ext4, btrfs

D. LUKS Encryption
E. Partitioning and Formatting Disks
F. RAID Considerations

VII. Custom Kernels
A. RedHawk Linux Kernel Overview
B. Building, Installing, and Configuration
C. Building Linux Device Drivers for Third-Party I/O Devices

VIII. Development Tools and Simulation Software
A. NightStar Tools Overview
B. SIMulation Workbench Overview
C. Licensing Requirements and Procedures

IX. Administering Users and Groups
A. User and Group Configuration Files
B. Shells and Display Manager
C. SSH & PAM

X. Networking
A. IP Adressing
B. Hostnames
C. Network Configuration Files and Utilities

XI. System Boot Process
A. BIOS and GRUB Configuration
B. Linux Kernel and SystemD

Laboratory Exercises:

As this is an intensive hands-on training course, students will use modern iHawk computer hardware and currently released software to perform a complete and fully functioning installation of RedHawk Linux, NightStar Tools, and SIMulation Workbench.