

Linux and OSS on IBM Z

Hardware, Software & Virtualization

for

■ **System Administrators**

■ **System Oriented Staff**

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1 Objectives

See what is possible with an extreme reliable and secure high-performance platform for Linux and open source software. Upon completion of this bundle, students will be able to

- Understand the HW features of z Systems and LinuxONE platform and what it differentiates from other platforms
- Understand the concept of virtualization and container techniques
- Describe the differences between LPARs and/or z/VM or KVM
- Describe the concept of container and Docker
- Describe the concept of a cloud stack architecture and how to implement it

2 Audience

System oriented people and administrators who are responsible of installing, operating, and maintaining a Linux on IBM Z Systems environment.

3 Prerequisites

Some system administration experience in either Linux, UNIX, z/OS or z/VM.

4 EMA builds on "Blended Learning"

In general, we organize (very view) face-to-face workshops. Most of the content is provided through e-learning techniques. In contrast to many other education providers, we coach our attendees very intensely during e-learning phases by organizing virtual classrooms twice a week.

All virtual classroom sessions are recorded and can be reviewed any time.

5 Content

Below the individual modules are described in detail. Numbers in brackets relate to the average amount of time needed for study. It is just an estimation. The effective time depends on your knowledge and on your interest in the corresponding subject.

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5.1 Kick-off Workshop (1,5 days)

Face-to-face Workshop

This one-and-a-half-day workshop serves as the basis for a successful cooperation during the entire training period. Depending on the participants' country of origin it takes place somewhere in Europe.

Duration 1,5 days

Date see start dates on website

Location Augsburg (Germany)

Workshop Objectives

The presence workshop aims at three things:

- Get to know other participants and key-lecturers
- Get familiar to the most important e-learning tools, especially the virtual classroom
- Participants get an initial overview of the seminar content

Content

Introduction

Round of introductions
Introduction to the topics

Learning Efficiency

Learning and neurobiology research
Efficient learning

E-Learning & Blended Learning

Significance of e-learning
Advantages of Blended Learning
Integration of digital techniques
E-learning tools

Moodle

Learning platform overview
Structure of the LMS

Virtual Classroom Environment

Virtual classroom session objectives
How VC differs from traditional classroom
Using the virtual classroom

Access to the Mainframe

EMA Infrastructure
Accessing the system(s)

IBM Z Architecture Overview

„Unique Features“ of IBM Z
HW / SW components
Virtualization techniques

Linux and OSS

Role of Open Source Software (OSS)
Linux introduction
Group work

5.2 IBM Z and LinuxONE Architecture (~30 hours)

Objectives

Students can describe the main characteristics of IBM Z and LinuxONE.

Audience

This module is intended for IT professionals who will be responsible for the installation, support, and maintenance of guests and virtual machines running in a z/VM environment.

Content

IBM Z and LinuxONE Architecture

Mainframe history
Quality of services (QoS) and the “ities”
Basic architecture
Myths vs. facts
Partitioning, virtualization and hipervisors
LPARs vs. z/VM and KVM
z Systems performance

IBM Z Hardware

What is a CEC/CPC?
Processor types
Processor weights
SMT
Support elements and HMC
I/O configurations
zFCP vs. DASD
Peripheral devices

IBM Z Software

Operating systems on IBM Z
From DOS via DOS/VSE up to z/VSE
Virtual Machine (VM) and z/VM
From PCP via MVS up to z/OS
Linux and Open Source Software on z Systems

Sysplex and GDPS

High availability configurations
Sysplex and parallel sysplex
GDPS
GDPS and z/VM

IBM Z and New Technologies

UNIX System Services (USS)
USS vs. Linux
Java on IBM Z
WebSphere and liberty profile
API ecosystem on z Systems
Service orientation and cloud computing

5.3 Hardware and Storage Administration on IBM Z (~30 hours)

Objectives

The students have a good understanding of an IBM Z hardware environment. They are able to set up a Linux on IBM Z hardware and storage configuration.

Audience

This module is intended for IT professionals who will be responsible for the installation, support, and maintenance of Linux on IBM Z.

Content

Hardware

Hardware Management Console

HMC security concept

Default users

sysprog

acsadmin

Objects and roles

Add new users

Activate and load

Support Element

Channel and port locations

I/O configuration

Activation profiles

Card specific advanced facilities

Power on reset

I/O Configuration

LPAR definitions

PCHID, CHPID, and CNTLUNIT

PCI functions

FC / FCP

OSA express

RoCE and zEDC

Hipersockets

Dynamic Partition Manager

Administration von LPARs

Aufbau und Komponenten

zOSMF Interface

Security

Crypto devices

Key management

TKE

Storage Administration

DS8K HMC

Command line interface

I/O port definitions

Arrays, ranks, and extend pools

Logical control units (FICON)

Disks

Volumes, volume groups, and

hostconnections (FC)

NPIV

SAN

HDS / EMC alternatives

Low end storage

Support

5.4 Linux on IBM Z Basics (~20 hours)

Objectives

The students know the history of Linux on mainframes. They can describe the role of open source software in general and how that fits into an enterprise world today.

Content

History

Linus Torvalds and the beginning of Linux
History of Linux on mainframes

Open Source Software (OSS)

General introduction
IBM and OSS
OSS in Enterprises
Life cycle management

Linux on IBM Z

Linux on z ecosystem
Linux distributions and z Systems
First steps recommendations

DevOps Aspects

DevOps principles
Culture and KPIs

Cloud Environments

Infrastructure as a Service (IaaS)
Container as a Service (CaaS)
Platform as a Service (PaaS)

Linux on IBM Z - Configurations

Linux native in an LPAR
Linux as z/VM guest
Linux in a KVM environment
Container solutions with Linux

Linux and z/OS

Collaboration between Linux and z/OS
Networking techniques

File Systems

Types of file systems
Recommendations

5.5 z/VM Virtualization (~80 hours)

Objectives

The students know the concepts of virtualization with z/VM. They can install z/VM and operate a z/VM environment.

Audience

This module is intended for IT professionals who will be responsible for the installation, support, and maintenance of guests and virtual machines running in a z/VM environment.

Content

Basics

z/VM components (CP / CMS)
Consoles (3215, 3270, GRAF, iucvconsole)
z/VM commands and structure
XEDIT
z/VM directory
Disk types and configurations
Concept of minidisks
Dirmaint
REXX
Planning and preparing

Networking

Network setup (tcpmaint)
Network adapters
Vswitches
OSA L2, L3
Hipersockets L2, L3
Hipersocket bridge
CTC, IUCV (for VSE)
Customize TCP/IP files

Single system image (SSI)

Initial Program Load (IPL)

DASD / EDEV / Minidisk
FCP

z/VM Operation

z/VM commands
Explore current configuration
Change parameters and environment
z/VM systems management API (SMAPI)
RACF for z/VM
Definition of disk pools
Disks resize
Deployment

- Manual install
- Automatic install
- Golden image
- Kiwi virtual appliance

System automation

Apply Service to the z/VM system

rsu, ptf, apar
localmod

5.6 Linux as z/VM Guests (~30 hours)

Objectives

The students are able install Linux within a z/VM environment.

Audience

This module is intended for IT professionals who will be responsible for the installation, support, and maintenance of guests and virtual machines running in a z/VM environment.

Content

Linux as z/VM Guests

Why Linux as z/VM guests?
Concepts and alternatives
SUSE Linux Enterprise Server (SLES)

Installing Linux on z/VM

Install SUSE Linux on IBM Z

Customizing Linux

Install additional packages
Backup and recovery procedures

Adding Users

User management

VSWITCH and VLAN

Cloning Linux systems
Manual install
Automatic install
Golden image
Kiwi virtual appliance

Administration

LVM
FCP und RAID
Terminal server

Networking

Network connectivity issues

5.7 z/VM and Linux on IBM Z Performance (~40 hours)

Objectives

The students can do basic performance analysis in a z/VM environment. They know the basic principles how to achieve performance goals.

Audience

This module is intended for IT professionals who will be responsible for the installation, support, maintenance and operation of guests and virtual machines running in a z/VM environment.

Content

Good Practices

- SWAP in memory
- HyperPAV
- Process and I/O scheduling
- CMM

Linux Performance

- CPU
- Disk I/O
- Network
- Memory
- Sysstat

z/VM Performance

- perfmon
- velocity

Dedicated vs. not dedicated

Monitoring and Capacity Planning

- Monwrite (Perftoolkit)
- Enterprise Performance Vision (EPV)

5.8 KVM (SUSE) Virtualization (~40 hours)

Objectives

The students know the history of Linux on mainframes. They can describe the role of open source software in general and how that fits into an enterprise world today.

Audience

This module is intended for IT professionals who will be responsible for planning and implementing a KVM environment on IBM Z.

Content

Virtualization Review

Virtualization basics review
KVM vs. z/VM

KVM for z Systems

Differences to x86 KVM
Planning the environment

Installing and Configuring KVM

Deployment
Network setup
Disk setup
Guest definitions
Consoles

Operation

Servicing KVM hypervisors
Live migrations
Cio ignore
High availability setups

KVM Performance

Monitoring a KVM environment

5.9 Application Container with Docker (20 hours)

Objectives

Students are able to plan and implement Docker containers in a IBM Z Linux environment.

Audience

This module is intended for IT professionals who will be responsible for setting up and implementing Docker containers in an IBM Z Linux environment.

Content

Container basics

Container vs. virtual machines

- Container is not a complete machine

- Container as one process

Docker

What is Docker?

Docker enabled operating systems

Docker administration

Networking with Docker

Inspecting a container

Servicing containers

Orchestration with Kubernetes

Docker in the Cloud

Scale out vs. scale up

Availability considerations

Performance

5.10 Java on Linux on IBM Z (30 hours)

Objectives

Java platform is a driving factor for Linux on IBM Z. Attendees know the basic concepts of Java on Linux on IBM Z.

Audience

Linux on IBM Z administrators.

Content

Java and Java EE

Java as a platform

Java evolution

Standard edition vs. Enterprise Edition

Performance of Java on IBM Z

How to improve Java performance on IBM Z

Hints and tips

WebSphere vs. Liberty Server

WebSphere Application Server (WAS)

Liberty Server

Characteristics and differences

5.11 Linux on IBM Z Operation (20 Stunden)

Objectives

Attendees are able to operate a Linux on IBM Z environment, keep the system up and running and know the basics of failure analysis and monitoring.

Audience

This module is intended for IT professionals who will be responsible for operating a Linux on IBM Z environment.

Description

Content

HW Operation

I/O configuration management
Availability issues

Failure Analysis

Preparation
How to create a dump
dbginfo, sosconfig, supportconfig

Maintenance & Updates

Rolling IPLs

Backup / Recovery

Desaster recovery

Rescue 101

z/VM issues
Linux issues

Monitoring

EREP
Spool / page
Tools