





Welcome to

0. Introduction

KEA System Integration F2020 10 ECTS

Henrik Lund Kramshøj hlk@zencurity.com @kramse  

Slides are available as PDF, [kramse@Github](https://github.com/kramse)
0-Introduction-system-integration.tex in the repo [security-courses](https://github.com/kramse/security-courses)

Contact information



- Henrik Lund Kramshøj, internet samurai mostly networks and infosec
- Independent network and security consultant
- Master from the Computer Science Department at the University of Copenhagen, DIKU
- Email: h1k@zencurity.dk xhek@kea.dk Mobile: +45 2026 6000

You are welcome to drop me an email

Plan for today



- Create a good starting point for learning
- Introduce lecturer and students
- Expectations for this course
- Literature list walkthrough

Course Materials



The materials needed for this course are in multiple parts:

- Slide shows - presentation - like this file
- Exercises - PDF which is updated along the way
- Books
- Additional resources from the internet

Note: the presentation slides are not a substitute for reading the books, papers and doing exercises, many details are not shown

I like to use Github for materials, and they are open source



Course: System Integration 10 ECTS

Teaching dates: Mondays starting 08:30

- Week 6: 08:30 - 11:45 today only
- Week 7-22 most weeks: 08:30 - 11:45 and 12:30 - 15:00
- Week 10 exception: 08:30 - 11:30 and 12:30 - 14:00, then "Praktikinfo" for some of you
- Watch out for other exceptions, like easter!
- Exceptions - no teaching on these dates: March 16. Conference, April 6. and 13. Easter, May 11. Conference

Semester plan

<https://zencurity.gitbook.io/kea-it-sikkerhed/system-integration/lektionsplan>

Exam: xx/xx 2020

Prerequisites



OSI Reference Model

Application
Presentation
Session
Transport
Network
Link
Physical

Internet protocol suite

Applications HTTP, SMTP, FTP, SNMP,	NFS
	XDR
	RPC
TCP UDP	
IPv4 IPv6 ICMPv6 ICMP	
ARP RARP MAC	
Ethernet token-ring ATM ...	

Participants are expected to have a basic understanding of software architectures and networking, as well as sufficient programming skills for independent development of software applications.

Intended Learning Outcomes



To get acquainted with the challenges of developing business applications

To understand the difference between

- tightly coupled and loosely coupled system
- synchronous and asynchronous integration

To get an overview of existing technologies and solutions in system integration

To get programming practice in developing P2P integration using networking protocols

Course Description



From: STUDIEORDNING

Knowledge

The objective is to give the student knowledge of

- business considerations associated with system integration
- standards and standardization organizations
- storage, transformation and integration of data resources
- techniques used in data conversion and migration
- the service concept and understanding of its connection with service-oriented architecture
- technologies that can be used to implement a service-oriented architecture
- integration tools

Skills



Skills

The objective is that the students acquire the ability to

- use object-oriented system in service-oriented architecture
- design a system for easy integration with other systems and using existing services
- transform or expand a system, so that it can work in a service-oriented architecture
- apply patterns that support system integration
- develop supplementary modules for generic systems
- integrate generic and other systems
- choose from different methods of integration
- translate elements of a business strategy into concrete requirements for system integration

Proficiencies



Proficiencies

The objective is that the students acquired proficiency in

- choosing from different integration techniques
- acquiring knowledge about development in standards for integration
- adapting IT architecture so that future integration of systems is taken into account
- converting elements in a business strategy to specific requirements for systems integration
- adapting a system development method, so that it supports system integration

Deliverables and Exam Procedure



- The course ends with a successful examination. The exam is individual, oral, censored, graded.
- The duration of the exam is up to 30 minutes.
- At the exam students can expect being asked any questions related to the learning objectives and presented material.

Pre-conditions

Students need to fulfill certain requirements completed mandatory tasks - to qualify for participating in the exam. Fulfilling the requirements automatically signs the student up for an exam. Alternatively, failing in delivering a mandatory task on time prevents the student from taking part in the exam.

- Deliverables:
- 2 Mandatory assignments which can be team work up to 3 students
- Both mandatory assignments are required in order to be entitled to the exam

Technologies used in this course



The following tools and environments are examples that may be introduced in this course:

- Programming languages and frameworks Java, Spring, Python
- Development environments IDE NetBeans / Eclipse / IntelliJ, Atom
- Systems for running Java: TomCat / GlassFish
- Networking and network protocols: TCP/IP, HTTP, DNS
- Formats XML, JSON, WSDL, GRPC, msgpack, protobuf, apache thrift
- Web technologies and services: REST, API, HTML5, CSS
- Tools like Git and Github
- Integration tools Camel
- Message queueing systems: MQ
- Aggregated example platforms: Elastic stack, logstash, elasticsearch, kibana, grafana
- Cloud and virtualisation Docker, Kubernetes, Azure, AWS, microservices

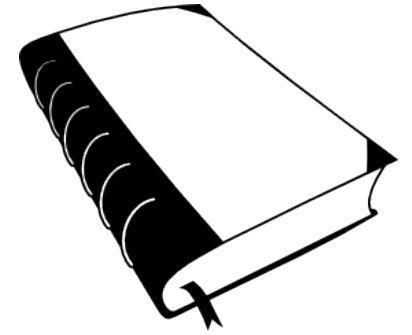
This list is not complete or a promise

Primary literature



Primary literature:

- *Enterprise Integration Patterns*, Gregor Hohpe and Bobby Woolf, EIP for short



Supporting literature:

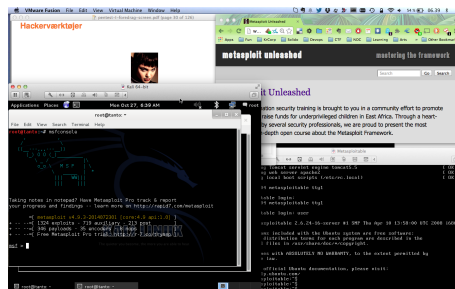
Free graphics by Lumen Design Studio

Book: Enterprise Integration Patterns



Enterprise Integration Patterns, Gregor Hohpe and Bobby Woolf, EIP for short

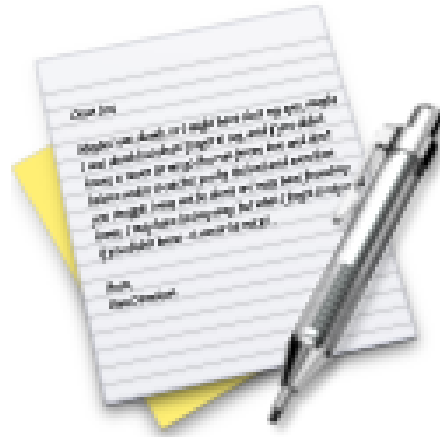
Lab Setup



- It will be great to have virtualisation running, to try various systems
- Hardware: modern laptop CPU with virtualisation
Don't forget to enable hardware virtualisation in the BIOS
- Virtualisation software: VMware, Virtual box, HyperV pick your poison
- Linux server system: Debian 10 Buster amd64 64-bit <https://www.debian.org/>
- Setup instructions can be found at <https://github.com/kramse/kramse-labs>

It is enough if these VMs are pr team

Exercise



Now lets do the exercise

Check your Debian VM 10 min

which is number **3** in the exercise PDF.

Command prompt



We will use Unix/Linux systems, and you need to use the command line a bit:

```
[h1k@fischer h1k]$ id
uid=6000(h1k) gid=20(staff) groups=20(staff),
0(wheel), 80(admin), 160(cvs)
[h1k@fischer h1k]$
```

```
[root@fischer h1k]# id
uid=0(root) gid=0(wheel) groups=0(wheel), 1(daemon),
2(kmem), 3(sys), 4(tty), 5(operator), 20(staff),
31(guest), 80(admin)
[root@fischer h1k]#
```

\$ is commonly used for showing a user login, while a # is for root logins

Change from user to root using the command sudo like sudo -s

Command Syntax



A common syntax for commands are described like this:

```
echo [-n] [string ...]
```

- The command is the first thing on the command line, you cannot write `henrik echo`
- Options are prefixed with dash `-n`, optional ones are in brackets `[]`
- Multiple options can be combined into one group like, `tar -cvf` eller `tar cvf`
- Some options require arguments, like `tar -cf filename` where `-f` needs a filename

Manual System



kommando [options] [argumenter]

\$ cal -j 2005

It is a book about a Spanish guy called Manual. You should read it. – Dilbert

The Unix/Linux manual system is where you find the options, commands and file formats

Manuals must be installed, if not install them immediately

Very similar across Unix variants, OpenBSD is known for having an excellent manual pages

`man -k` allows keyword search similar can be done using `apropos`

Try `man crontab` and `man 5 crontab`

Example Manual Page



NAME

`cal` - displays a calendar

SYNOPSIS

`cal [-jy] [[month] year]`

DESCRIPTION

`cal` displays a simple calendar. If arguments are not specified, the current month is displayed. The options are as follows:

- `-j` Display julian dates (days one-based, numbered from January 1).
- `-y` Display a calendar for the current year.

The Gregorian Reformation is assumed to have occurred in 1752 on the 3rd of September. By this time, most countries had recognized the reformation (although a few did not recognize it until the early 1900's.) Ten days following that date were eliminated by the reformation, so the calendar for that month is a bit unusual.

Unix Command Line Shells



- sh - Bourne Shell
- bash - Bourne Again Shell, often the default in Linux
- ksh - Korn shell, originally by David Korn, popular version pdksh public domain ksh
- csh - C shell, syntax close to the C programming language
- multiple others exist: zsh, tcsh

Comparable to command.com, cmd.exe and powershell in Windows

Also commonly used for small programs, scripts

When writing scripts use the characters number sign and exclamation mark (`#!`) in the beginning

See more in [https://en.wikipedia.org/wiki/Shell_\(computing\)](https://en.wikipedia.org/wiki/Shell_(computing))

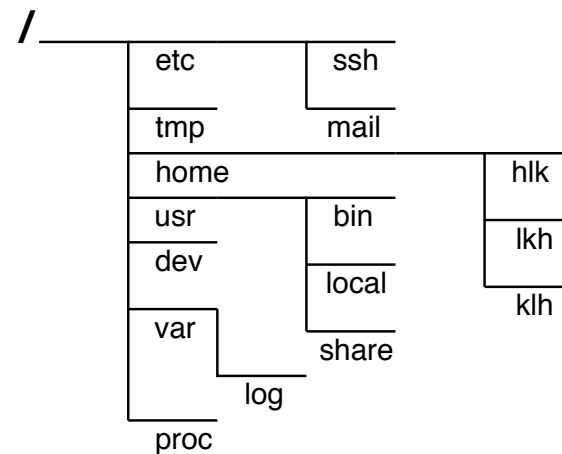
[https://en.wikipedia.org/wiki/Shebang_\(Unix\)](https://en.wikipedia.org/wiki/Shebang_(Unix))

Linux file system and konfiguration



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- Unix/Linux uses a virtual filesystem
https://en.wikipedia.org/wiki/Unix_filesystem
- No drive letters, just disks mounted in a common tree
- Everything starts with the file system root / - forward
- An important directory is /etc/ which includes a lot of configuration for the system and applications



For Next Time



Think about the subjects from this time, write down questions

Check the plan for chapters to read in the books

Visit web sites and download papers if needed

Retry the exercises to get more confident using the tools

Buy the books!