*:96 Internet application layer protocols and standards

Compendium 0
Course description, schema, etc.

Not allowed during the exam
Last revision: 11 Jan 2004

[v1]

Internet application protocols and standards

Contents and references for a technical university course on Internet application layer protocols and standards.

Last revision: 20 December, 2004
This course is usually repeated twice a year, in January-February and in August-September.

Schema spring 2005 (pdf format).

Study Plan from autumn 2003 (Note: If you are using the old compendiums, you also need the old Study Plan.)

Added overheads about CSS in September 2004.

Correction to the compendiums autumn 2003.

Course presenter: Professor Jacob Palme
Phone: +46-8-16 16 67
E-mail: jpalme@dsv.su.se.

Course segment codes: SU: *.96, KTH: 2I1263.

Table of contents

Goal

To describe the most common application layer protocols on the Internet, and to describe the general principles and methods used in these protocols.

This course segment is given twice a year, once in the spring and once in the fall. KTH students might only be allowed to participate at one of these two times.

Swedish, less complete info (Svensk information, kortare och ej helt aktuell).

Segment contents

- Methods and solutions in design of distributed application layer protocols: Architecture, ports, layering, protocols, authentication, connection-less and connection-oriented protocols, chaining, referral, multicasting, replication and caching.
- Extensibility in distributed applications.
- How software based on old and new versions of a protocol can interact.
- DNS (Domain Naming System) - Globally unique names, specifying and searching.
- ABNF (Augmented Bachus-Naur Format) - A common way of specifying the syntax in many Internet application layer protocols.
- An alternative encoding method: ASN.1 (Abstract Syntax Notation One).
- A third encoding method: XML: Extended Markup Language.
- The Basic Encoding Rules (BER) for ASN.1 for example Kerberos, LDAP, SNMP and S/MIME.
- URL, URI, URN, URC (Uniform Resource Locator, Identifier, Name, Characteristics).
- Media types.
- SMTP (Simple Mail Transport Protocol) - A protocol for transport of e-mail.
- RFC822 - A protocol for the format of e-mail.
- MIME (Multipurpose Internet Mail Extensions) - A protocol for content and media types, used by both e-mail and the WWW.
- POP (Post Office Protocol) and IMAP - E-mail delivery protocols.
- NNTP (Network News Transfer Protocol) - A protocol for the transmission of Network News.
- FTP (File Transfer Protocol) - A protocol for file transmission.
- HTML (Hypertext Markup Language) - A formatting language for WWW documents. How to produce your own web pages. Tools for web page generation.
- CSS (Cascacing Style Sheets) a language for controlling the layout of HTML and XML documents.
- XSLT (Extensible Style Sheet Language Transformations) a language for specifying reformatting of XML and HTML documents.
- HTTP (Hypertext Transfer Protocol) - The access protocol of the World Wide Web.
- Directory systems: X.500, Whois and Whois++.
- CGI (Common Gateway Interface) - Standard for interfacing applications to WWW servers.
- PICS (Platform Independent Content Selection) - a protocol for voluntary access control.
- Adaptation of Internet to other languages than English.
- The process of developing standards in IETF (Internet Engineering Task Force), ITU (International Telecommunications Union) and ISO (International Standards Organisation).

- The golden rule: "Be liberal in what you accept, be conservative in what you produce.

Course segment format

The course segment format is lectures, reading materials, a small work task, and an exam.

Changes since previous instances of this course segment

Changes in the fall of 2000: There will be more about e-mail standards and technology, and a new compendium 9 with information about e-mail has been added to the course segment documentation.

Changes in the spring of 2000: Much more complete coverage of XML.The work task is changed and is based on XML instead of on HTML. New additional compendiums with XML information.

Changes in the spring of 1999.
Changes in the year 2000.
Changes in the spring of 2001.
Changes in September 2002.
Changes in January 2003.
Changes in August 2004: XSLT and CSS added.

To get a complete view of the changes until September 2003, just take any two of the files below and compute a diff between them, for example using the **Tools -> Track changes -> Compare documents** command in MS Word.

2002-12-03	2001-03-11
2002-08-29	2000-11-05
2002-03-05	2000-10-22
2002-02-21	2000-10-11
2001-12-21	2000-02-18
2001-08-28	

Prerequisites

In order to understand this segment, you have to have some experience in using the Internet, especially the World Wide Web and e-mail. If you do not have such experience, you will have problems following the segment. This segment is not primarily a course segment about usage of the Internet, it is a segment about how Internet works, for students who already know the basics of how to use the Internet. If you do not know the basics of how Internet works, read some book about it and try it out yourself before the start of the course segment.

You should also have some knowledge about how computers work, such as a programming course segment or some other technically oriented course segment about computers.

Special for KTH students

Information about registration, etc. is provided by Pia Haapala, phone +46-8-16 49 43, e-mail <piah@dsv.su.se>.

All KTH students must register their participation in this course segment to the study counseling ("studievägledning") at KTH.

Students in KTH courses of type self-contained and further education ("fristående", "fortbildning" and "vidareutbildning") must use application forms provided by the education and research administrative unit, Valhallavägen 79, KTH. The forms can be ordered from utbildningsexpeditionen, phone +46-8-790 70 07 or +46-8-790 70 08, fax +46-8-790 68 87.

Mailing List, First Class Conference

Important information about this segment will be distributed through an e-mail mailing list and this mailing list will be copied to a First Class conference. The same information will be sent to all two media, so students can choose to subscribe to either. If, however you want to send a question, send it to the mailing list, not to the First Class forum.

All course segment participants should either register for this mailing list or regularly access the First Class conference.

Registering for the mailing list

To register for the mailing list, send a message to: listserv@su.se which contains the text:

```
SUB INTPROT Nils Nilsson
```

where `"Nils Nilsson"` is replaced by your name (not your e-mail address).

Important: This text should be in the text of the message, *not* in the Subject!

You should get a confirmation message from LISTSERV saying that you have been added to the list.

After doing this, you can send questions about the course segment by e-mail to intprot@su.se. The question and my answer will be published both through the mailing list and in First Class, even if you send the question only to the mailing list.

At the end of the course segment, you can unsubscribe from the mailing list, by sending a message to listserv@su.se which contains the text:

```
UNS INTPROT
```

Using First Class

If you prefer to get the information through First Class, get an account at the DSV First Class server. If you are registered in this course segment, the INTPRO First Class conference should be on your desktop. If you prefer to use First Class, move all submeetings (INTPRO Dokumentation, INTPRO Handledning and INTPRO Fritt forum), to your First Class desktop. However, if you prefer to use First Class, you should still send your questions to the teacher by e-mail to intprot@su.se and not write them in the First Class conference. Your questions, and the teachers's answers, will still appear in the First Class conference.


Get a working e-mail address

In order to take part in this course segment, you have to have a working e-mail address, where you read your mail regularly. Note that DSV can give you an e-mail address on our computers, if you do not have any. You can also get free e-mail accounts with a number of Internet providers.

If you have an e-mail account outside from DSV, but also have a Unix account at DSV (such an account automatically includes an e-mail account), and if you read your e-mail more regularly on the account outside of DSV, then you should arrange for forwarding of e-mail from the DSV account to the external mail account. There is a simple description on how to do this.

Location

The location for the course segment is the department of computer and systems sciences, Stockholm University and KTH, in Forum, Kista, north of Stockholm. Some exams may be in other locations.
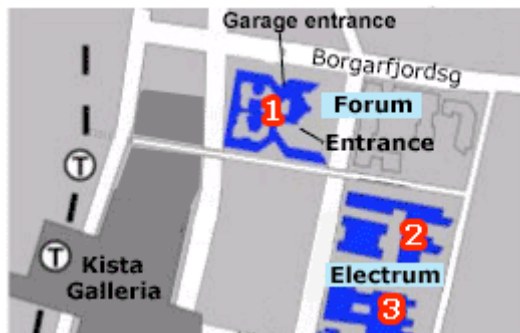
2 on the map indicates the location of lecture room F3.
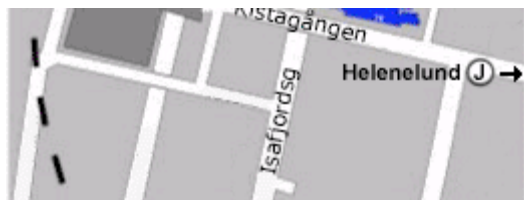
Lectures

Lectures

The lectures are not mandatory, but there may be questions in the exam which ask about things mentioned in the overheads but more fully described in the lectures. Thus, if you do not go to the lectures, read the overheads carefully and ensure that you understand what is behind each overhead, not only what is actually on the overhead.

Exercise times

You can go to the DSV terminal rooms at any time, but if you go at times when the terminal rooms are booked for this course segment, you have priority of using the computers. At other times, other course segments may have priority in using the computers.

Requirements for passing this course segment

For passing this course segment you must pass the exam (3.5 points), and you must submit the XML work task as described below (0.5 points).

Exams

For those exams, which are in the Forum building, room will be announced on a notice board inside the main entrance immediately before the exam and on a telephone answerer on number 674 70 04 the day before the exam.

Do not forget that you must register in advance, in order to participate in the exam. Registran is done using Daisy. If you do not have any account in Daisy, you can get such an account in Passerkortsrummet, Forum, Kista, lift A, floor 6. This rooms is only open at certain times, which are displayed on the door of the room.

Note that many of the documents for this course segment can be brought and used during the exam. For more info on which documents can be brought to the exam, see the list of reading material.

A few copies of the reading material, which are allowed to use during the exam, will be available for loan during the exam, for those who have not bought their own copies of these documents.

Old exams

> Most of the exam questions have been collected in a web site where they are ordered in logical order and with references to the replies, in a format suitable for self-studies.

Note: The contents of the course segment has shifted over the years, so old exams may not give a correct representation of the current course segment content. For example, XML was added in the year 2000, exams before 2000 do not ask such detailed questions on XML.

Exam 960920 with correct answers.
Exam 961026 with correct answers.
Exam 970111 with correct answers. (in Swedish)
Exam 971031 with correct answers

Note that since the exams above were given, this course segment has been extended from 3 to 4 weeks (points), by adding part from a previous course segment *:73. Below are some examples of exams from *:73:

Exam 960429 in Swedish and English
Exam 960615 only in Swedish

Below are exams given after the change from 3 to 4 points

Exam 970919 with correct answers	Exam 011208 with correct answers
Exam 980508 with correct answers	Exam 020306 with correct answers
Exam 980604 with correct answers	Exam 020522 with correct answers
Exam 980926 with correct answers	Exam 021019 with correct answers
Exam 981121 with correct answers	Exam 021202 with correct answers
Exam 990601 with correct answers	Exam 030310 with correct answers
Exam 990823 with correct answers	Exam 030428 with correct answers
Exam 990918 with correct answers	Exam 031018 with correct answers
Exam 991109 with correct answers	Exam 031126 with correct answers
Exam 000419 with correct answers	Exam 040214 with correct answers
Exam 000522 with correct answers	Exam 040310 with correct answers
Exam 001114 with correct answers	Exam 040422 with correct answers
Exam 010116 with correct answers	Exam 041022 with correct answers
Exam 010221 with correct answers	Exam 041204 with correct answers
Exam 010831 with correct answers	
Exam 011020 with correct answers	

Important note: Since XML was not included in this course segment before the year 2000, exams in the year 2000 or later may contain questions about XML, even though there are no such questions in the old exams.

Observe especially the following exam questions:

001114-4, 980508-1, 990601-4, In these questions, you are not asked to specify something which already exists, but to specify extensions to standard. Such extensions should be written in the format used in related standard, and it should contain both a syntax and a semantics section, unless the question text says that only syntax is required.

Work task

About cheating: It is not allowed to download an existing DTD or XML from the Internet, or from a task done by someone else, and supply it, either as is or modified. It is not allowed to falsely report the validation result. Cheating may result in exclusion from future studies at the university for a period of several weeks or months.

Old work task: The work task is entirely different from the spring 2000 onwards, compared to 1999 and earlier.

Scheduled times: The times scheduled for the work tasks ("laborationer") are only scheduled so that you have priority to the workstations at those times. There will be no tutor present, you can do the work tasks with other workstations or home computers if you so prefer, there is no scheduled plan for the content of these times.

Submission time: Work tasks should be submitted on or before the Monday after the first exam. I will collect late arriving tasks and process them every second month.

1. Write an XML DTD specification, and an XML text following this specification. A hint: Take any document you have, such as a web page, a ticket, a pamphlet, a time-table, and try to encode the information on it using XML.

2. **Important!**

    Your dtd and xml documents must make use of the following facilities

    1. **Multiple nested XML elements.**
    2. **Different types of attributes on elements.**
    3. **You must include a report from a program which checks the correctness of the DTD and XML used, such as the XML validator at http://www.stg.brown.edu/service/xmlvalid/**
        How to use the validator:
        a. Create a subdirectory, to the WWW directory on your unix account at DSV or your personal web site. The subdirectory can, for example, have the name xml.
        b. Put both the DTD and the XML files on this subdirector (you can use the FTP program to move the files to your unix account at DSV.)
        c. The XML file should contain the file name of the DTD file as a relative URL in the <!DOCTYPE> tag.
        d. Access the XML validator, and put the URL of the XML file into the URI field in the validator window.

     e. If your account at DSV is "my-name", and the XML file has the path "WWW/xml/xml-file.xml" then the URL to this file will be "http://dsv.su.se/%7Emy-name/xml/xml-file.xml" [More info on how to use the validator](#).

     f. Warning: Do not use UTF-8, the validator cannot handle it.

4. **Include the report from the validator when you submit the work task.**

5. **Minimum length 20 lines for both the DTD and the XML file.**

3. Use of CSS is permitted, but not required. This means that your XML need not be very readable when printed with a web browser.

4. There will not be any supervision during the allocated lab times. If you have problems, you are welcome to contact me by [phone or e-mail](#) or after the lectures, or come to my office room (but I am seldom there).

5. Deliver the completed task and put it into the box for "inlämningsuppgifter" outside studentexpeditionen at DSV in Forum, or send it by postal mail (**not e-mail**) to Jacob Palme not later than the first Monday after the first exam after the start of the course segment. (Late tasks will also be accepted, but acceptance of them may be delayed up to two months.)

Your submission of the work task **must** contain the following items:

     a. the DSV preface for work tasks (available in [HTML](#) or [RTF-format](#)).

     b. Your social security number ("personnummer").

     c. A print-out on paper of the DTD TEXT.

     d. A print-out of the XML text using this DTD.

     e. A print-out from a [service](#) which validates the correctness of the DTD and XML.

Submit the work task in the box for work task submissions outside Studentexpeditionen, DSV, or send it by postal mail to Jacob Palme, DSV, Forum 100, 164 40 Kista.

If you need extra fast handling of the work task, send it by postal mail to Jacob Palme, Skeppargatan 73, 11530 Stockholm, and mark the work task with the words "URGENT" or "BRÅTTOM" in large visible letters on the first page of the work task submission.

Students enrolled in the course segment in 1999 or earlier, can instead perform [the old work task](#) which was used in the course segment during those years.

Some hints on common problems with the XML task

Problems with National characters (åäöüøé¿, etc.) in XML: You must choose to encode the National characters using either UTF-8 or ISO 8859-1. If you use ISO 8859-1, then the processing instruction

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
```

must be placed at the top of the XML file. If you use national characters in the DTD file, you may have to put a similar instruction in that file.

The validator cannot find my files: Check with an ordinary web browser that you can access the DTD and XML files using the same URL as sent to the validator.

How to get neat layout of the XML when shown with a web browser: This is *not* required for the work task. But if you want to do it, you can use CSS, see the example in compendium 8, section 1.35.

Combining DTD and XML in one file: It is possible to combine DTD and XML in a single file. This means that you do not have to upload the DTD file to a server before testing your XML.

Reading

The reading material consists of eight compendiums.

They are sold by Studerandeexpeditionen, DSV.

If you have old compendium, there are additions-compendiums with new information added to the course at various times. New information in the autumn 2002 can be found in this additions-compendium.

Table of contents for the reading materials sold by Studentexpeditionen: http://dsv.su.se/jpalme/internet-course/p96-compendiums.pdf

Incomplete texts for the compendiums are available online in PDF format as follows:

For the September 2003 course segment, the compendiums were re-organized. Here is a list of the new compendiums, after the re-organisation.

Compendium No. and link	Allowed during the exam?	Content	Available on the web?
compendium-0.pdf	No	Course description, study plan, etc.	All.
compendium-1.pdf	Yes	Original standards document for ASN.1, ABNF, DNS, E-mail and LDAP.	All except page 1-11.
compendium-2.pdf	Yes	Original standards on FTP, Cookies, Usenet News, HTTP, URLs and lists of port numbers and media types.	Probably all.
compendium-3.pdf	Yes	HTML 4.01 specification.	All.
compendium-4.pdf	No	Networking basics, e-mail and NNTP.	Partially.
compendium-5.pdf	No	GIF, JPEG, CGI, FTP, HTTP, IRC, PICS, X.500.	Partially.
compendium-6.pdf	NO	Coding, ABNF, ASN.1.	All.
compendium-7.pdf	Yes	XML original Recommendation (=official standard)	All.
compendium-8.pdf	No	Overheads	All.
CGI-XSL-OHs.pdf	No	Overheads on CGI and XSL	All.

| compendium-9.pdf | Yes | CSS and XSLT Recommendations | All. |

List of additional (partly not mandatory, and partly not up-to-date) reading materials for this course segment:
http://dsv.su.se/jpalme/internet-course/P96-litt.html

Study Plan:
http://dsv.su.se/jpalme/internet-course/p96-study-plan.html

Additional overheads for the lectures might be added at URL:
http://dsv.su.se/jpalme/internet-course/extra-overheads.html

Introductory chapters with basic concepts for this course segment:
http://dsv.su.se/jpalme/abook/basics-chapter.pdf
http://dsv.su.se/jpalme/abook/coding.pdf

An explanation of how to think when solving ASN.1 question:
http://dsv.su.se/jpalme/internet-course/solving-asn-1-exercise.html

Why do most web pages adhere to some simple common layout principles?

Which font is most readable on the screen:

http://dsv.su.se/jpalme/internet-course/font-report.html

Font size comparisons:
http://dsv.su.se/jpalme/internet-course/font-size-comparisons.html

Why bitmapped screen dumps sometimes get ugly when shown on the screen
http://dsv.su.se/jpalme/internet-course/why-bitmapped-ohs-are-ugly/

A web-based ASN.1 series of exercises with automatic checking that the answer you write is correct can be found at http://asn1.elibel.tm.fr/tutorial.

Additional Reading (If you want to learn more)

"ASN.1 - Communication between heterogeneous systems" by Olivier Dubuisson, available on the net and from bookstores. A very comprehensive and detailed book about ASN.1.

Web Design Layout Principles - Why are most web pages designed the way they are?
Getting started with HTML.
HTML code tutorial.
Direct answers to question about HTML.

Other course segments which may be of interest

URL: http://dsv.su.se/jpalme/courses.html

URL for this web page

http://dsv.su.se/jpalme/internet-course/Int-app-prot-kurs.html

Internet Application Protocols and Standards

Recommended Study Plan

File name:
http://dsv.su.se/jpalme/internet-course/p96-study-plan.html

Latest change: 2004-08-23

Home page for this course:
http://dsv.su.se/jpalme/internet-course/Int-app-prot-kurs.html

Note 1: This study plan agrees with the new compendiums in the autumn of 2003. If you use the old compendiums in the spring of 2002 and earlier, then you should use the old study plan.

Note 2: To print this study plan on paper on a Macintosh with Microsoft Explorer, set Page Setup to 180 % and Text zoom to 75 %.

Course Description, Work Task Description

Compendium number and page number		Title
0	2-13	Course Segment Description
0	18	An overview of common Internet protocols and services

Basic Concepts, DNS

4	39-61	Overhead pictures for the introductory lectures
4	2-34	Introduction and basic concepts
6	1-67	Coding methods

Compendium 0 page 14

4	39	Cache Consistency Mechanisms
4	39-61	The Domain Name System
1	19-46	RFC 1034: Domain Names
4	36-37	Distributed File Systems
4	34-35	A Beginner's Guide to URLs
2	425-437	Uniform Resource Locators (URL)
8	120-123	Overheads on URL and media types
2	445-460	IANA Registry of Port Numbers
2	461-468	IANA Registry of Media Types

ABNF

6	11-16	Coding methods
8	15-25	*:96 Overheads Part 2: ABNF
1	12-18	RFC 2234: Augmented BNF for Syntax Specifications: ABNF

ASN.1

6	16-38	Coding methods
6	70-87	A Layman's Guide to a Subset of ASN.1, BER and DER
1	2-11	ASN.1 syntax
6	88-97	Exercises on ASN.1 and BER

XML

6	41-55	XML Introduction
8	106-119	XML OHs
7	913-929	XML Recommendation (=Standard)

E-mail

Compendium 0 page 15

4	64-97	Message handling overview
8	140-149	*:96 Overheads Part 3: E-mail
4	98-11	Applications: Electronic Mail
8	151-155	*:96 Overheads Part 4: Message Delivery Protocols
4	112-118	Post Office Protocol
4	118-119	Interactive Mail Access Protocol
1	47-305	RFC 2821, 2822, 2197, 2045, 2047, 2048, 2049, 1891, 1892, 1894, 1725, 2060

NNTP, Usenet News Transfer Protocol

4	123-125	News and Usenet
4	126-136	NNTP, Network News Transfer Protocol
2	299-308	RFC 1036: Standard for Interchange of Usenet Messages
2	411-424	RFC 977: NNTP

X.500, LDAP = Light-Weight Directory Access Protocol

5	55-62	The Organisation of the Directory
1	307-341	RFC 2251-2252 LDAP

FTP = File Transfer Protocol

8	159-162	*:96 Overheads Part 5: FTP
5	10-30	FTP File Transfer System
2	252-287	RFC 959: File Transfer Protocol (FTP)

HTTP = Hypertext Transfer Protocol

8	124-130	*:96 Overheads Part 7: HTTP
5	31-36	HTTP: Hypertext Transfer Protocol
8	131-132	OHs on cookies
2	288-298	RFC 2109: HTTP State Management Mechanism (Cookies)
2	309-410	RFC 2068: HTTP 1.1

CGI = Common Gateway Interface

5	4-9	Common Gateway Interface Tutorial

Compendium 0 page 16

HTML, CSS and XSLT

6	38-41	HTML and CSS
8	71-96	*:96 Overheads Part 6: HTML
6	98-100	HTML Style Guides
3	461-642	HTML 4.0 Specification
10		CSS Recommendation
10		XSLT Recommendation

Miscellaneous

5	1-3	Bildformat i datorer
5	50-54	PICS Internet Access Controls Without Censorship
4	47-48	Internet Relay Chat
5	49	Other application layer standards

Exercise before the exam

Not printed	On-line data base of old exam questions: http://dsv.su.se/jpalme/internet-course/internet-standards-exams.html

Schema Applikationsprotokoll och standarder i Internet, 4p (*:96/2I1263/2I4063) VT2005 (prio-tider anges ej i denna version av schemat)

Momentansvarig: Jacob Palme

Utskrivet: 2004-12-20 Kursbeskrivining se http://dsv.su.se/jpalme/internet-course/Int-app-prot-kurs.html

Datum	Tid	Lokal	Aktivitet	Beskrivning	Lärare
Vecka 4					
2005-01-24	10:00-12:00	314*	L1	Introduktion, grundläggande nätverksbegrepp.	Palme Jacob
	13:00-15:00	314*	L2	Demonstrationer av nätuppkoppling med SMTP och HTTP, grundläggande nätverksbegrepp, kodning.	Palme Jacob
2005-01-25	10:00-12:00	314*	L3	Kodning, ABNF, ASN.1.	Palme Jacob
	13:00-15:00	F3*	L4	ABNF, ASN.1.	Palme Jacob
2005-01-27	10:00-12:00	314*	L7	ASN.1.	Palme Jacob
	14:00-16:00	314*	L8	CGI, XSLT.	Kilander Fredrik
2005-01-28	10:00-12:00	314*	L5	HTML.	Palme Jacob
	13:00-15:00	314*	L6	HTML.	Palme Jacob
Vecka 5					
2005-01-31	10:00-12:00	Sal C*	L9	XML.	Palme Jacob
	13:00-15:00	Sal B*	L10	CSS.	Palme Jacob
2005-02-01	10:00-12:00	314*	L11	Media types, URLs, HTTP.	Palme Jacob
	13:00-15:00	401*	L12	HTTP, Cookies, E-post.	Palme Jacob
2005-02-02	10:00-12:00	F3*	L13	E-post.	Palme Jacob
	13:00-15:00	F3*	L14	E-post.	Palme Jacob
Vecka 6					
2005-02-07	11:00-14:00	F3*	L15	PICS, FTP, X.500, Hur standarder utvecklas.	Palme Jacob
2005-02-08	10:00-13:00	215*	L16	Reservtid, denna föreläsning inställs antagligen.	Palme Jacob
Vecka 7					
2005-02-17	16:00-18:00	F3*	L17	Frågestund inför tentamen.	Palme Jacob

Tentamen

Typ	Datum	Tid	Lokal
Omtenta SU/KTH-period, 3,5p	2005-05-26	14:00-18:00	Forum, Kista*
Ordinarie tenta KTH-period, 3,5p	2005-03-09	14:00-18:00	501,502*
Uppsamlingstenta, 3,5p	2005-08-24	14:00-18:00	Forum, Kista*
inlupp, 0,5p	2005-03-19	0:00	
Ordinarie tenta SU-period, 3,5p	2005-03-19	10:00-14:00	313,F3*

An overview of common Internet protocols and services

It is a pre-requisite for this course that you have some experience with using Internet services as an ordinary user. The course is **not** on how to use the services, it is about the protocols used to provide them.

Last revision: 10 August, 2002 by Jacob Palme.

Protocol name	Main usage	Clients	Servers
DNS	1. Translating domain names to numerical host addresses. 2. Finding the e-mail server handling mail to e-mail addresses with certain domain names.	All kinds of clients and name servers.	(DNS) name servers.
HTTP (and HTML, GIF, JPEG as formats)	Downloading web pages in the WWW. Can also be used to send in filled in forms and to send in files. Also used for many specialized protocols based on HTTP.	Web browsers.	HTTP servers.
SMTP (and RFC822 and MIME as formats)	Sending and forwarding of e-mail to and between MTAs (Message Transfer Agents).	Mail clients and SMTP servers.	SMTP servers.
(SMIME and PGP)	Adding security features to e-mail.	Mail clients.	SMTP servers, certificate servers.
POP and IMAP	Downloading of incoming e-mail to the mail clients for their recipients.	Mail clients.	POP or IMAP servers.
NNTP	Submission, downloading and forwarding of Usenet News articles.	News clients and news servers.	News servers.
FTP	Anonymous downloading of files, non-anonymous transfer of files between directories protected by log in.	FTP clients, Web browsers.	FTP servers.
Gopher	An old, nowadays not much used protocols, which can be seen as a limited subset of HTTP.	Web browsers, Gopher clients.	Gopher servers.
PICS	Protection of children from material on the net regarded as unsuitable for them, and other kinds of controlled censorship.	All kinds of clients.	PICS servers, PICS labels on, for example, HTML pages.
LDAP	Searching in directories.	LDAP clients, often built into e-mail clients.	LDAP servers.
WebDav	Uploading and downloading of web pages edited by a group of people.	WebDav clients.	WebDav-compliant HTTP servers.

Guide to earlier compendiums (spring 2003 and earlier)

Note: The compendiums which are allowed during the exam (compendium 1, 2, 3 och 7, printed on coloured paper) have not been changed in September 2003 and are therefore not included in this guide.

Compendium 4 - **Basics, E-mail & NNTP**

Page	*Title*	*Earlier compendium*
1-33	Introduction and basic concepts	6, s 876-908
34-35	A Beginner's Guide to URLs	5A, s 619-620
36-37	Distributed File Systems	4, s 463-464
38	Cache Consistency Mechanisms	4, s 465
39-61	The Domain Name System	4, s 472-494
62-97	Message Handling Overview	9, s 10-45
98-111	Applications: Electronic Mail (822, SMTP, MIME)	4, s 495-508
112-118	Post Office Protocol	4, s 738-743
118-119	Interactive Mail Access Protocol	4, s 744-745
120-122	Interactive Mail Access Protocol Version 4	4, s 746-748
122-123	Pretty Good Privacy	4, s 748-749
123-125	News and Usenet/NNTP	4, s 749-751
126-136	NNTP: Network News Transfer Protocol	4, s 509-519

Compendium 5 - *Miscellaneous*

Page	*Title*	*Earlier compendium*
1-3	Bildformat i datorer	9, s 51-55
4-9	CGI Tutorial - Common Gateway Interface	4, s 466-471
10-30	FTP: File Transfer Protocol	4, s 520-540
31-46	HTTP: HyperText Transfer Protocol	4, s 541-556
47-48	Internet Relay Chat	4, s 752-753
49	Other Application Layer Standards	9, s 56
50-54	PICS Internet Access Controls Without Censorship	5A, s 614-618
55-62	X.500 - The organisation of the directory	4, s 558-564

Compendium 6 - *Coding*

Page	Title	Earlier compendium
1-66	Coding Methods	5B, s 1026-1089
67-84	A Layman's Guide to a Subset of ASN.1, BER and DER	5A, s 821-854
85	A summary of ASN.1 types and their usage	8, s 110
85-87	Example of how you can think when solving an ASN.1 exam question	8, s 111-114
88-97	Övningsuppgifter på ASN.1 och BER	4, s 459-462
98-100	Quick HTML Guide	5A, s 592-594
101-103	Getting started with HTML	5A, s 595-597
104-108	Adding a touch of style	5A, s 598-602
109-115	The Bare Bones Guide to HTML	5A, s 603-609
116-117	Space: The First Frontier	5A, s 611-612
118	Top Ten Mistakes in web Design	5A, s 613
119-125	En stilguide för väven	5A, s 773-779
126	Font Size Comparisons as Shown on Screen	9, s 2
127	The Multipart/Related content Type	9, s 46
128-129	Why Bitmapped Screen Dumps get Ugly on the Screen	9, s 47-50
130-	XML	4, s 754-[vl]

Compendium 8 - *Overheads*

Page	Title	Earlier compendium
1-14	Networking basic concepts, DNS	5A, s 862-876
15-25	Encoding ABNF	5A, s 877-887
26-70	Encoding ASN.1	5A, s 888-932
71-96	World Wide Web, Hypertext Markup Language (HTML)	5A, s 974-999
97-105	HTML (Frames, HTML 4.0, Style Sheets, Good HTML,Testing HTML)	5B, s 1000-1008
106-119	Extensible Markup Language (XML)	5A, s 933-946 + 8, s 115-128 (ny ver.)
120-123	URL, Media types	5A, s 947-950
124-130	Hypertext Transfer Protocol (HTTP)	5B, s 1009-1017
131-132	Cookies	5B, s 1018-1019
133-139	E-mail basics	9, s 3-9
140-149	E-mail, SMTP, RFC822, MIME	5A, s 955-964
150	Combining multipart/related and multipart/alternative	9, s 57
151-155	Message Delivery Protocols (POP and IMAP) & Network News	5A, s 965-969
156-158	Platform for Internet Content Selection (PICS)	5B, s 1024-1026
159-162	File Transfer Protocol (FTP)	5A, s 970-973
163-166	Directory systems: X.500, Whois	5B, s 1020-1023
167-171	Common Gateway Interface (CGI)	8, s 105-109

Compendium 4

Page	Title	New compendium
443-457	Course Segment Description	Kursanv, s 1-10
459-462	Övningsuppgifter på ASN.1 och BER	6, s 88-97
463-464	Distributed File Systems	4, s 36-37
465	Cache Consistency Mechanisms	4, s 38
466-471	Common Gateway Interface Tutorial	5, s 4-9
472-494	The Domain Name System	4, s 39-61
495-508	Applications: Electronic Mail (822, SMTP, MIME)	4, s 98-111
509-519	NNTP: Network News Transfer Protocol	4, s 126-136
520-540	FTP: File Transfer Protocol	5, s 10-30
541-556	HTTP: Hypertext Transfer Protocol	5, s 31-46
558-564	X.500 - The organisation of the directory	5, s 55-62
738-743	Post Office Protocol	4, s 112-118
744-745	Interactive Mail Access Protocol	4, s 118-119
746-748	Interactive Mail Access Protocol Version 4	4, s 120-122
748-749	Pretty Good Privacy	4, s 122-123
749-751	News and Usenet/NNTP	4, s 123-125
752-753	Internet Relay Chat	4, s 47-48
754-	XML	6, s 128-[v1]

Compendium 5A

Page	Title	New compendium
592-594	Quick HTML Guide	6, s 98-100
595-597	Getting started with HTML	6, s 101-103
598-602	Adding a touch of style	6, s 104-108
603-609	The Bare Bones Guide to HTML	6, s 109-115
611-612	Space: The First Frontier	6, s 116-117
613	Top Ten Mistakes in web Design	6, s 118
614-618	PICS Internet Access Controls Without Censorship	5, s 50-54
619-620	A Beginner's Guide to URLs	4, s 34-35
773-779	En stilguide för väven	6, s 117-123
821-854	A Layman's Guide to a Subset of ASN.1, BER and DER	6, s 67-84
862-876	Part 1: Basics	8, s 1-14
877-887	Part 2a: ABNF	8, s 15-25
888-932	Part 2b: ASN.1	8, s 26-70
933-946	Part 2c: XML	8, s 106-119
947-950	Part 2c: URL, Media types	8, s 120-123
955-964	Part 3: E-mail, SMTP, RFC822, MIME	8, s 140-149
965-969	Part 4: Message Delivery Protocols (POP and IMAP)	8, s 151-155
970-973	Part 5: FTP	8, s 159-162
974-999	Part 6a-6c: World Wide Web, Hypertext Markup Language (HTML)	8, s 71-96

Note: The compendiums which are allowed on the exam, and printed on yellow paper, were not changed and are therefore not included in this list.

Compendium 5B

Page	Title	New compendium
1000-1008	Part 6d: HTML (Frames, HTML 4.0, Style Sheets, Good HTML,Testing HTML)	8, s 97-105
1009-1017	Part 7: Hypertext Transfer Protocol (HTTP)	8, s 124-130
1018-1019	Part 7b: Cookies	8, s 131-132
1020-1025	Part 8: Directory systems, PICS	8, s 156-158 + s 163-166
1026-1089	Coding Methods	6, s 1-66

Compendium 6

Page	Title	New compendium
876-908	Introduction and basic concepts	1-33
909-911	Study plan for this course	K
912	An overview of common Internet protocols and services	K

Compendium 8

Page	Title	New compendium
105-109	Overheads on CGI	8, s 167-171
110	A summary of ASN.1 types and their usage	6, s 85
111-114	Example of how you can think when solving an ASN.1 exam question	6, s 85-87
115-128	Extensible Markup Language (XML) overheads	8, s 106-119

Compendium 9

Page	Title	New compendium
2	Font Size Comparisons as Shown on Screen	6, s 124
3-9	E-mail basics	8, s 133-139
10-45	Message Handling Overview	4, s 62-97
46	The Multipart/Related content Type	6, s 125
47-50	Why Bitmapped Screen Dumps get Ugly on the Screen	6, s126-127
51-55	Bildformat i datorer	5, s 1-3
56	Other Application Layer Standards	5, s 49
57	Combining multipart/related and multipart/alternative	8, s 150
58	PICS Terminology	8, s 158
59	Where are the Overheads?	K

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