



Institutionen för Data-
och Systemvetenskap



STOCKHOLMS
UNIVERSITET



KUNGLIGA
TEKNISKA
HÖGSKOLAN

***:96 (SU) and 2I1263 (KTH)
Internet Application Protocols
and Standards**

Exam 2003-10-18

The following documents are allowed during the exam:

1. Documents in Compendium 1, printed on colored paper.
2. Documents in Compendium 2, printed on colored paper.
3. Documents in Compendium 3, printed on colored paper.
4. Documents in Compendium 7, printed on colored paper.
5. Ordinary language dictionaries between English and Swedish.

Note 1: Compendium 4, 5, 6, 8 and 9 are not allowed during the exam. The exam supervisor will check that you do not have copies of compendiums 4, 5, 6, 8 and 9 printed on color paper. Bringing such compendiums on colored paper is cheating and can result in suspension of your rights to study.

Note 2: Underscoring and short handwritten notes in the yellow documents are allowed.

Note 3: A few copies of these compendiums (part 1-3 and 7) will be available for loan during the exam for students who have not bought the compendiums.

Important warning

It is not acceptable to answer an exam question by just a verbatim quote from the allowed documents above. You must show that you understand the question and your answer by using your own words.

Jacob Palme will come to the exam room around 12:00 to check if you have any problems with understanding any of the questions.



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No.	Question in English	Question in Swedish	Max points
1.	Data transmitted from one computer to another usually contains a number of different information elements. When data is transformed to a bit stream for transmission, there is a need to indicate where in the bit stream a certain element starts and ends. Discuss various methods of doing this, and the pros and cons of the various choices. Your answer should cover protocols defined using ASN.1, ABNF and XML-DTD.	När data sänds från en dator till en annan, överförs vanligen ett flertal olika informationselement. När data omvandlas till en bitström för överföring, finns ett behov att ange var i bitströmmen som ett visst element börjar och slutar. Diskutera olika metoder att göra detta, och deras för- och nackdelar. Ditt svar skall täcka in protokoll specificerade i ASN.1, ABNF och XML-DTD.	6
	<i>Answer:</i>		
	<u>Method</u>	<u>Pros and cons</u>	
	Method 1: Precede the data element with a counter, indicating for example how many bytes will follow.	Difficult for a human to write and read. Requires counting before sending (which may not always be possible, if data is sent while it is generated).	
	Method 2: Use different kinds of punctuation, such as "@", space, ".", "</" to indicate the end.	May require special rules forbidding or requiring special coding of the punctuation characters in the data element sent.	
	Method 3: A hybrid of method 1 and 2, split data into chunks, indicate the length in advance of each chunk, but use punctuation to mark the end of all the chunks.	Difficult for a human to write and read, but does not require counting of all data before sending starts.	



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No.	Question in English	Question in Swedish	Max points
2	When a user has filled in a form in a web browser, the form content is usually transmitted through HTTP to a web server. There are two different formats for encoding the form data in this HTTP transmission. Describe the main principles and differences between these two formats, including pros and cons and when one or the other method is best.	När en användare har fyllt i ett formulär i en webbläsare, skickas formulärets innehåll vanligen in med HTTP till en webbserver. Det finns två olika format för kodning av formulärdata i denna HTTP-överföring. Beskriv huvudprinciperna och skillnaderna mellan dessa två format, inklusive deras för- och nackdelar, och när den ena eller den andra är lämplig.	6

Answer:

HTTP operation	Format name	Description	Pros and cons
GET	multipart/www-form-url-encoded	Data appended to the end of the URL, preceded by a question-mark.	Short, compact, fast format. Can be bookmarked and used in hyperlinks. Visible and modifyable by the user (can be a security risk). Content must be in ASCII format. Limited length.
POST	multipart/form-data	Using mime multi-part format in body of HTTP request	Can handle files and any character encoding Recommended when data will be changed on the server



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No.	Question in English	Question in Swedish	Max points
3	<p>The SMTP standard specifies that the dialogue between client and server should include a series of steps, where the server must respond to each step before the next step commences. What are the disadvantages with this, what alternative exists in newer e-mail standards, and what are the pros- and cons of this alternative.</p>	<p>SMTP-standarden anger att dialogen mellan klient och server skall innefatta en serie av steg, där servern skall svara på varje steg innan nästa steg påbörjas. Vad är nackdelarna med detta, vilket alternativ finns i nyare e-post-standarder, och vad som är för- och nackdelarna med detta alternativ.</p>	6
	<p><i>Answer:</i></p> <p>Disadvantage: Because every roundtrip incurs a delay, the total transmission time will be longer.</p> <p>Solution: Send next operation without waiting for the result of the previous operation. This method is called "Pipelining" .</p> <p>Disadvantage with this solution: If an error occurs, client has to retract to a previous state, not supported by all mailers , efficiency loss if errors are common.</p>		
4	<p>You are to define a protocol for sending video clips from a Martian explorer to the earth. Each video clip is sent with a time stamp, a direction in which the camera was aimed, and the video itself. Would ASN.1, ABNF or XML be suitable for specifying the transmission protocol? Why? Write the syntax specification using the most suitable of these three specification languages for this application.</p>	<p>Du skall definiera ett protokoll för att sända videosnuttar från en mars-sond till jorden. Varje videosnutt sänds tillsammans med en tidsuppgift, kamerans riktning, och själva videon. Skulle ASN.1, ABNF eller XML vara lämpligast för ett sådant överföringsprotokoll? Varför? Skriv en syntaxspecifikation, med användning av det av dessa tre protokoll som är lämpligast i denna speciella tillämpning.</p>	6

Answer:

ASN.1 is most suitable, since ABNF and XML cannot handle binary data.

```
VideoClip ::= SEQUENCE {
    video BITSTRING,
    timeStamp UNIVERSALTIME,
    direction Direction }
```

```
Direction ::= SEQUENCE {
    height REAL,
    angle REAL,
    rotation REAL }
```