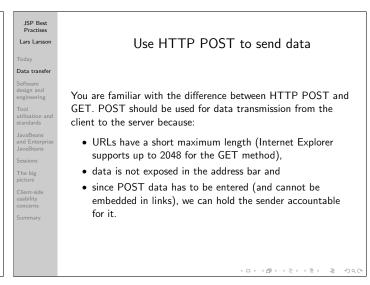
| JSP Best |
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| Practises |
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| Client-side usability concerns | 7 Client-side usability concerns |
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| JSP Best Practises Lars Larsson Today | Data transfer |
|---|---|
| Software design and engineering Tool utilisation and standards JavaBeans and Enterprise JavaBeans Sessions The big picture Client-side usability concerns Summary | As you know, data transfer is very important in server-side web development. Obviously, we need to validate data coming in from the user, and we should always do so with great scrutiny. The rule of thumb is to write once and read many times: invalid data may corrupt our entire database, so any time spent validating it is worth it. We may use tools and technologies for this purpose, and we will get to that later in the lecture. This first portion of the lecture deals with how we perform data transfer. |



Appropriate use of HTTP GET

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Appropriate use of HTTP GET

Appropriate use of HTTP GET

Appropriate use of HTTP GET

Allows embedded data in the request, we can create links to resources that need processing on the server side such as search results or choosing which sub-page we want to view.

It is a good idea to use GET if the interaction is like a question that may be asked several times, but not if we need to transmit one-shot data. GET also enables us to do caching and makes it possible for users to create bookmarks to resources.

GET should only be used if it is side-effect free: repeated GETs should not modify anything on the server side.

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HTTPS introduces some overhead: connection establishment takes longer and more memory is required on the server side, since each document has to be sent over encrypted channels.
Still, we should use HTTPS every time we send anything even remotely sensitive.

Many users distrust the Internet, since they don't feel safe and under constant surveillance. Help these people by using encryption, and your site might just become more popular than the competition's!

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Cookies and safety

Never, **ever**, send anything sensitive in cookies! Cookies are stored on the client's machine (which we cannot know is safe) – in plain text. Of course, one might encrypt the contents of the cookie, but that leaves us with two problems:

- if we never change the encryption key, one can use the cookie and crack the key,
- if we do change the encryption key, we will not be able to decrypt the cookie after a change, rendering the cookie useless.

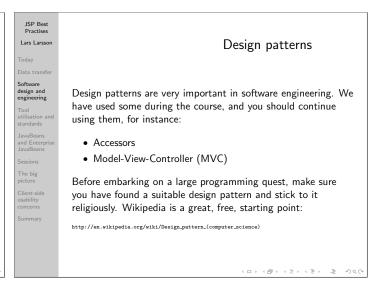
 $\boldsymbol{\mathsf{Do}}$ $\boldsymbol{\mathsf{not}}$ rely on cookies – users may choose to block them and they can be deleted at random times.

JSP Best Practises Lars Larsson Today Data transfer Software design and engineering Tool JavaBeans JavaBeans JavaBeans JavaBeans Sessions The big picture Client-side use their development process. The following is a security checklist for ASP.NET 2.0, but most of it applies to JSP as well: http://msdn2.microsoft.com/en-us/library/ms998249.aspx

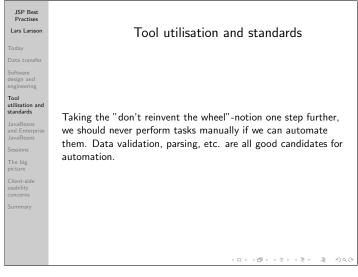
| JSP Best Practises Lars Larsson | Correct mime-type | JSP Best Practises Lars Larsson | Software design and engineering |
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| Today | | Today | |
| Data transfer | | Data transfer | |
| Software design and engineering | | Software design and engineering | |
| Tool utilisation and standards | Web browsers are growing increasingly more capable when it | Tool utilisation and standards | The topic of good software design and engineering is too large |
| JavaBeans and Enterprise JavaBeans | comes to displaying various files and at guessing what the contents of a file may be, but we must always send the correct | JavaBeans and Enterprise JavaBeans | to cover here and we recommend that you take at least one course on it. |
| Sessions | mime-type when we deal with anything other than | Sessions | During this course, we have used several techniques and |
| The big picture | text/html. Never assume that the browser guesses correctly, they most certainly don't! | The big picture | important concepts that you should apply during your future |
| Client-side usability concerns | they most certainly don't. | Client-side usability concerns | development. |
| Summary | | Summary | |
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| JSP Bes Practise Lars Larss Today Data transl | Tag libraries | JSP Best Practises Lars Larsson Today Data transfer Software | Downloadable tag libraries |
| design and engineering Tool utilisation: standards JavaBeans and Enterp JavaBeans Sessions The big picture Client-side usability concerns | Large code blocks are hard to maintain, and they become very distracting while developing a site. It is much better to put these large code blocks in tag libraries. like the ones you used | design and engineering Tool utilisation and statement of the statement of | There are many tag libraries available for download that you can use in future projects. They simplify tasks that are often carried out and allow you to develop working sites faster. Visit the following sites: http://java.sun.com/products/jsp/jstl/ http://java.sun.com/products/jsp/jstl/ |
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Structure and hierarchies Today Data transfer Software design and engineering Tool utilisation and standards JavaBeans and Enterprise JavaBeans The big picture Client-side usability concerns Summary Structure and hierarchies Always build a site as if it were ten times its intended size. Make sure that everything (code, images, static documents) is neatly placed in logical structures and hierarchies, because once your site happens to become popular and grow the initial costs of creating a good structure will be enormous winnings in simplified maintenance.



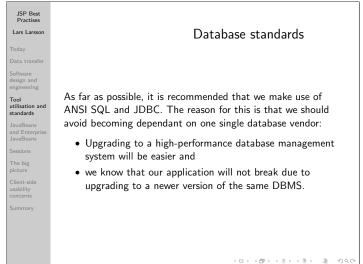
| JSP Best Practises Lars Larsson Today Data transfer | Tried and tested code |
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| Software design and engineering | |
| Tool utilisation and standards | The key to rapid development of secure and functional software is to use tried and tested code. We should never reinvent the |
| JavaBeans and Enterprise JavaBeans | wheel, unless we are forced to. Java itself comes with a plethora of useful classes and we can add many useful web |
| Sessions | components by downloading them from the Jakarta Commons |
| The big picture | project: |
| Client-side usability concerns | http://jakarta.apache.org/commons/ |
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| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards JavaBeans and Enterprise JavaBeans Sessions The big picture Client-side usability concerns Summary | We can, and should, use XML schemas for validation of data. The basic idea is that we take data, put it in an XML document and see if it validates using an XML schema. Since the XML schema language is so powerful, we can place a large number of constraints on the data. Therefore, if the XML document passes validation, it contains data in our required format. |
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Validation via XMI Schemas

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| JSP Best Practises Lars Larsson | Dead links |
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| Data transfer Software design and engineering Tool utilisation and standards | Dead links lower users' opinion of your site by a lot, it looks |
| JavaBeans and Enterprise JavaBeans Sessions The big picture Client-side usability concerns | unprofessional and is incredibly annoying. Therefore, you should always make sure that your links are alive – preferably using an automated tool. There are many tools that do this, and you should find one you are comfortable with using since you should do it often. |
| Summary | (a) (B) (E) (E) & 9QC |

| JSP Best Practises Lars Larsson | HTTP response codes |
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| Today | · |
| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | HTTD has remones codes that you are familiar with (404 |
| JavaBeans and Enterprise JavaBeans | HTTP has response codes that you are familiar with (404 should be well known, for instance). These should always be |
| Sessions | used, since they let the browser handle it in a way that is |
| The big picture | (hopefully) customisable and familiar to the user. |
| Client-side usability concerns | |
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| JSP Best Practises | |
| Lars Larsson | Error pages |
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| Software design and engineering | |
| Tool utilisation and | JSP has support for custom error pages, which should be used. |
| standards | Displaying stack traces and other technical information is very |
| JavaBeans and Enterprise | bad, since it reveals intimate details from your code that might |
| JavaBeans | be of use to an attacker. This is closely related to information |
| Sessions | leakage. |
| The big picture | Error pages are special pages that are displayed automatically |
| Client-side usability concerns | when an exception occurs, and they are provided with information on the exception that occurred. |
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| JSP Best Practises Lars Larsson | Error pages, example |
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| Data transfer | |
| Software design and engineering | The following line allows a page to act as an error page: |
| Tool utilisation and standards | <%0 page isErrorPage="true" %> |
| JavaBeans and Enterprise JavaBeans | Within the other pages on the site, we set which error page should be used like so: |
| Sessions | Silould be used like so. |
| The big picture Client-side usability | <pre><%@ page errorPage="theErrorPage.jsp" %></pre> |
| concerns | The exception that occurred is stored in a variable called exception, which can be analysed and handled in some way. |
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| JSP Best Practises Lars Larsson | Using web.xml |
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| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | When we deploy a web application, we should always use a |
| JavaBeans and Enterprise JavaBeans | deployment descriptor, where we can set such things as error pages and other settings that are important to the web |
| Sessions | application. |
| The big picture | See chapter 5 in "More Servlets", which is devoted entirely to |
| Client-side usability concerns | this topic. |
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| JSP Best Practises Lars Larsson Today Data transfer | File uploads |
|--|---|
| Software design and engineering Tool utilisation and standards JavaBeans and Enterprise JavaBeans The big picture Client-side usability concerns Summary | We have not covered file uploads yet during this course but it is simple to do using the appropriate code from Jakarta Commons. Using ready-made code from the Jakarta Commons project, handling file uploads is a snap. Study the User Guide and download the FileUpload package from this address to get started: http://jakarta.apache.org/commons/fileupload/ |
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JavaBeans - regular and Enterprise

JavaBeans and Enterprise JavaBeans help us as programmers create re-usable and easily maintained code. We shall take a look at these technologies, which are of tremendous value in large scale development.

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JavaBeans

JavaBeans are simply Java classes that adhere to a certain naming convention, which makes it easy to analyse them and thus plug them into new situations.

- getX(), setX() implies that the bean has a value X
 that can be manipulated. The type is inferred by the
 argument to setX() and the return type of getX()
- ullet is X() investigate the bean's boolean value X

All JavaBeans must have a constructor that takes no arguments, they must be serializeable and should not contain any required event-handling methods.

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JavaBeans continued

The point of JavaBeans is that they can act as components of larger software and be plugged in to software on-the-fly with a minimum of effort. They can be manipulated by a visual tool, since the set of methods convey enough information on the capabilities of the bean.

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Enterprise JavaBeans

Enterprise JavaBeans (EJB) encapsulate the business logic of an application (such as handling databases, security and other behind-the-scenes type of jobs). The idea is that business logic is typically re-usable, whereas user interfaces are not.

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Application servers

EJBs reside in an application server environment. The application server provides the beans with persistence, transaction processing, concurrency control, events, naming and directory services, security, simple deployment, remote procedure calls and exposure of business methods as web services. EJBs are distributed objects.

Getting all of the above from the environment means that the EJB programmer can concentrate on the task at hand and not worry about these (hard!) topics.

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EJB types

 $\ensuremath{\mathsf{EJBs}}$ are placed in $\ensuremath{\mathsf{EJB}}$ containers, of which there are three main types:

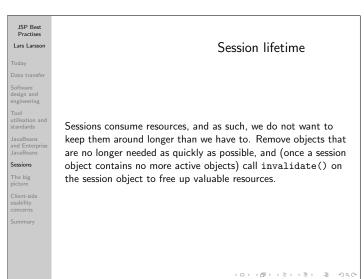
- Session Beans:
 - $\bullet \ \, \mathsf{Stateless} \,\, \mathsf{Session} \,\, \mathsf{Beans} \mathsf{allows} \,\, \mathsf{concurrent} \,\, \mathsf{access}$
 - Stateful Session Beans maintains state, disallows concurrent access
- Entity Beans distributed objects having a persistent state, not on a session basis
- Message Driven Beans asynchronous beans

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| JSP Best Practises Lars Larsson | EJB tutorial and example |
| Today | ' |
| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | EJBs are too complicated to be covered during this lecture, but |
| JavaBeans and Enterprise JavaBeans | you are recommended and encouraged to find out more information on your own. Sun provides the following useful |
| Sessions | resource: |
| The big picture | http://java.sun.com/developer/onlineTraining/Beans/EJBTutorial/ |
| Client-side usability concerns | |
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| JSP Best Practises | |
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| Lars Larsson | Sessions |
| Today | 363510113 |
| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | |
| JavaBeans and Enterprise JavaBeans | Sessions have been used during this course and are of great importance in today's Internet, so we should study some best |
| Sessions | practises related to them. |
| The big picture | |
| Client-side usability concerns | |
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| JSP Best Practises | | | |
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| Lars Larsson | Session security | | |
| Today | • | | |
| Data transfer | | | |
| Software design and engineering | | | |
| Tool utilisation and standards | Sessions are identified by session IDs. Thus, a common attack is to hijack an existing session ID and use it as your own. Using | | |
| JavaBeans and Enterprise JavaBeans | HTTPS alleviates this problem, and should be used unless there is a very compelling reason not to. | | |
| Sessions | Secure all of the pages when you apply security to some part of | | |
| The big picture | your site – all resources from which as session is created (or | | |
| Client-side usability | accessed) must be either secured or unsecured. Mixing is not | | |
| concerns | possible. | | |
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| JSP Best Practises | |
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| Lars Larsson | Objects in sessions |
| Today | |
| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | If you need to store objects in a session, do so by making the |
| JavaBeans and Enterprise JavaBeans | objects serializeable. Make sure that the classes are in the correct class path, so they can be deserialised correctly and |
| Sessions | without namespace conflicts. |
| The big picture | Avoid storing large amounts of data in sessions, it is very inefficient |
| Client-side usability concerns | inefficient. |
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| JSP Best Practises Lars Larsson Today Data transfer Software design and | The big picture |
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| engineering Tool utilisation and standards JavaBeans and Enterprise JavaBeans Sessions The big picture Client-side usability concerns Summary | We need to keep track of the big picture when we develop web sites – the Internet grows quickly and so do our sites when we suddenly become successful. Never simply write a bunch of JSP pages that you stick in a directory somewhere – it scales horribly. Make environments such as the one used in the assignments and create web applications – it pays off in the long run. |

JSP Best Practises Lars Larsson Today Data transfer Software design and engineering Tool JavaBeans JavaBeans JavaBeans Sessions The big picture Client-side usability Concerns Summary Web services are useful and enable us to do many exciting things, as long as they work together. There are competing technologies, but for the same reason that we should use ANSI SQL and JDBC, we should strive to use the WSDL when we create web services. Being backed by the W3C is a major strength.



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| JSP Best Practises Lars Larsson Today Data transfer Software | Client-side usability concerns | JSP Best Practises Lars Larsson Today Data transfer | Usability resources |
| Sottware design and engineering Tool utilisation an standards JavaBeans and Enterpris JavaBeans Sessions The big picture Client-side usability concerns Summary | Since you should all have taken a course on client-side web development, it is sufficient to note the following: • Don't use JavaScript unless you have to (AJAX is fine, but replacing standard browser features like handling links or scrollbars isn't!). • Never assume that your users have any of the following (even if you do): good displays with high resolution and many colours, good vision, ability to use a mouse, colour vision, desire to read long texts or above average | Software design and engineering Tool utilisation and standards JavaBeans and Enterprise JavaBeans Sessions The big picture Client-side usability concerns Summary | These are a few good links on usability, which were also shown during the final lecture in the client-side web development course (5DV077): • http://www.useit.com/ • http://www.uidesign.net/ • http://www.usabilityinstitute.com/ • http://www.usability.gov/ |

| JSP Best Practises | |
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| Lars Larsson | Summary |
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| Today | |
| Data transfer | |
| Software design and engineering | |
| Tool utilisation and standards | During this lecture, we have studied some best practises related to JSP and web development in general. What it all boils down |
| JavaBeans and Enterprise JavaBeans | to in the end is common sense and being careful. The most resource-consuming part of any software development project is |
| Sessions | in the maintenance, so any extra time spent in the design |
| The big picture | phase will be repaid many times over later on. |
| Client-side usability concerns | Next lecture introduces other server-side web development languages and environments, and compares them to JSP. |
| Summary | |
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