CS603 – Web Engineering

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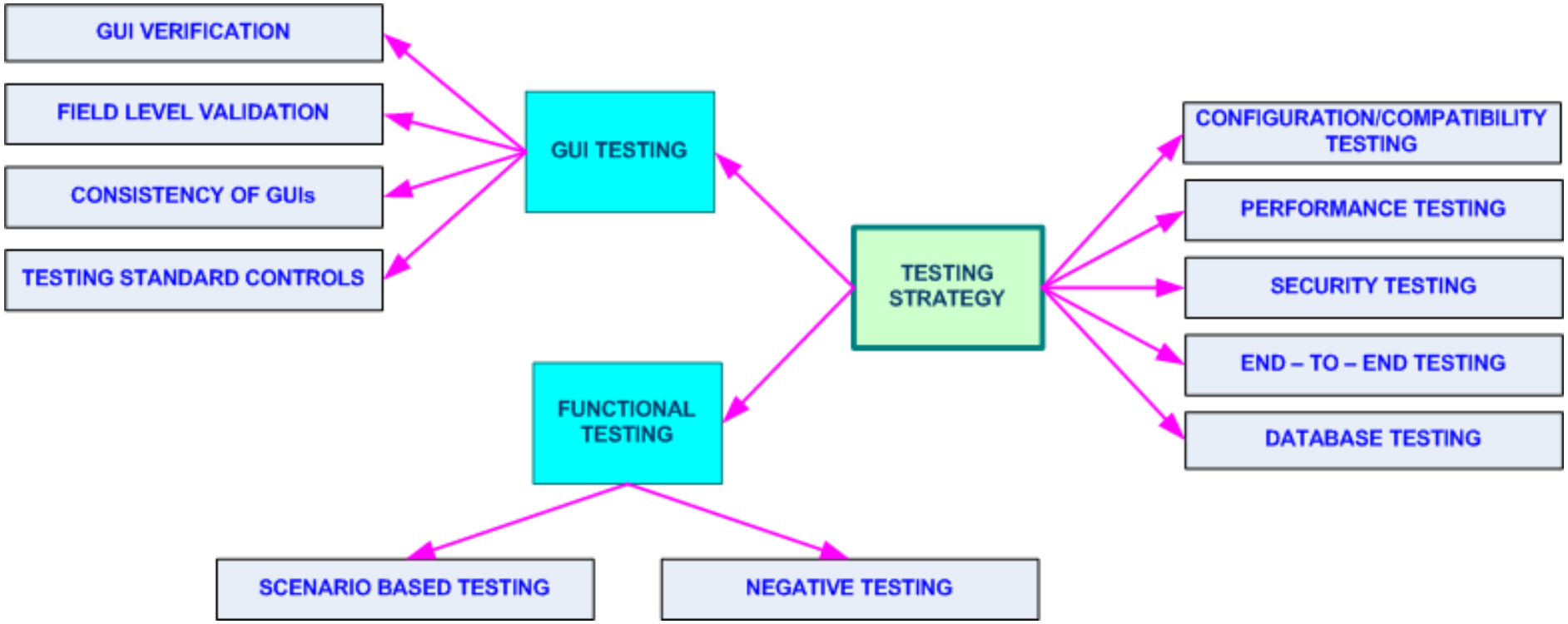
Testing

Website Testing Strategy

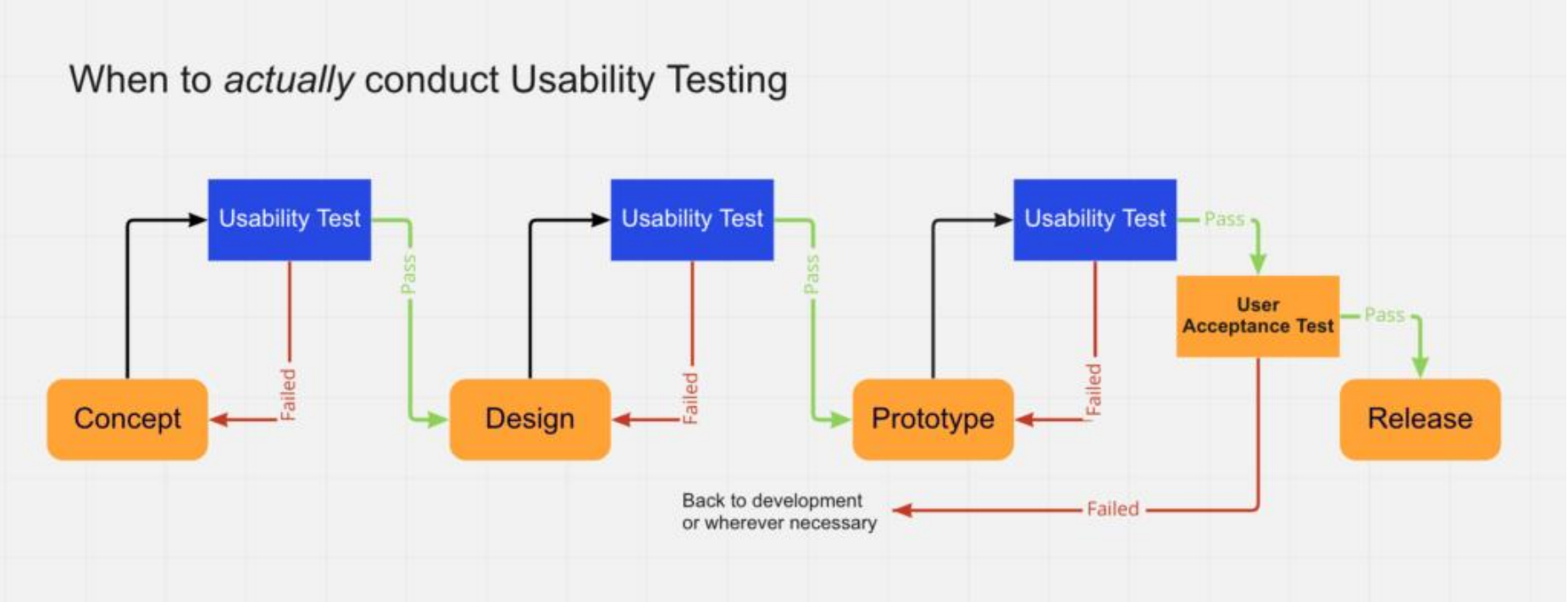


Web Testing Strategy

- **Functionality Testing:**
- Verify there is no dead page or invalid redirects.
- First check all the validations on each field.
- Wrong inputs to perform negative testing.
- Verify the workflow of the system.
- Verify the data integrity.

Web Testing Strategy

- **Usability testing -** To verify how the application is easy to use with.
  - Test the navigation and controls. Forms, Text Boxes. Images, Menu Items, Links, etc.
  - Content checking.
  - Check for user intuition.



Web Testing Strategy

- **Interface testing -** Performed to verify the interface and the dataflow from one system to other.

Web Testing Strategy

- **Compatibility testing-** Compatibility testing is performed based on the context of the application.
  - Browser compatibility
  - Operating system compatibility
  - Compatible to various devices like notebook, mobile, etc.

- This includes checking that JavaScript, AJAX, WebSockets, browser notifications, and authentication requests are working as designed, especially if you're using jwt authentication.
- LambdaTest is recommended, a cross-browser testing cloud, for browser compatibility testing.
- Using the Lambda tool, users can test their website on 2000+ real browsers & OS devices.

Web Testing Strategy

- **Performance testing -** Performed to verify the server response time and throughput under various load conditions.
  - **Load testing -**
    - It is the simplest form of testing conducted to understand the behaviour of the system under a specific load.
    - Load testing will result in measuring important business critical transactions and load on the database, application server, etc. are also monitored.
  - **Stress testing -**
    - It is performed to find the upper limit capacity of the system and also to determine how the system performs if the current load goes well above the expected maximum.
  - **Soak testing -**
    - Soak Testing also known as endurance testing, is performed to determine the system parameters under continuous expected load.
    - During soak tests the parameters such as memory utilization is monitored to detect memory leaks or other performance issues. The main aim is to discover the system's performance under sustained use.
  - **Spike testing -**
    - Spike testing is performed by increasing the number of users suddenly by a very large amount and measuring the performance of the system.
    - The main aim is to determine whether the system will be able to sustain the work load.

Web Testing Strategy

- **Security testing -** Performed to verify if the application is secured on web as data theft and unauthorized access are more common issues
  - Injection
  - Broken Authentication and Session Management
  - Cross-Site Scripting (XSS)
  - Insecure Direct Object References
  - Security Misconfiguration
  - Sensitive Data Exposure
  - Missing Function Level Access Control
  - Cross-Site Request Forgery (CSRF)
  - Using Components with Known Vulnerabilities
  - Unvalidated Redirects and Forwards

Web Testing Strategy

- Crowd Testing:
- also known as crowd source testing
- large group of people are selected to perform testing on a web application
- they can share their respective feedbacks and suggestions on the web application
- it is helpful in identifying unnotified bugs or errors

Testing tools for web application development

- **Automated testing tools:**
  - indispensable for performing repetitive and systematic tests, ensuring your web application remains functional and free of regressions throughout development.

- Some popular automated testing tools include:
  - **Selenium:**
    - Selenium is a versatile tool for automating browser interactions, supporting various programming languages and browsers.
    - It's widely used for functional and regression testing.
  - **Cypress:**
    - modern end-to-end testing framework designed for web applications.
    - It offers real-time reloading and a robust debugging experience.
  - **Jest:**
    - Primarily used for JavaScript-based applications,
    - Jest is a testing framework emphasizing simplicity and speed.
    - It's commonly used for unit and component testing.

Testing tools for web application development

- **Load testing tools:**
- Load testing tools help assess how your web application performs under different user traffic and stress levels.
- Apache JMeter:
  - JMeter is an open-source tool for load and performance testing,
  - capable of simulating various scenarios and load levels.
- LoadRunner:
  - is a comprehensive performance testing tool that offers a wide array of protocols and integration capabilities.
- Gatling:
  - highly scalable and open-source load testing tool that uses the Scala programming language for scripting realistic scenarios.

Testing tools for web application development

- **Security testing tools**
- OWASP ZAP:
  - The OWASP Zed Attack Proxy (ZAP) is a widely-used open-source security testing tool that helps find security vulnerabilities during development and testing.
- Burp Suite:
  - powerful suite of tools for web application security testing.
  - It includes features for scanning, crawling, and exploiting vulnerabilities.
- Nessus: Nessus is a network vulnerability scanner that can also be used to identify security issues in web applications.

Testing tools for web application development

- **Cross-Browser Testing Tools**
- BrowserStack:
  - provides a cloud-based platform for testing web applications on various browsers and devices.
- CrossBrowserTesting:
  - offers real-time testing of web applications on a wide range of browsers, including mobile devices.
- Sauce Labs:
  - provides a cloud-based testing platform for automated cross-browser testing.

Testing tools for web application development

- **Accessibility testing tools**
- axe:
  - open-source accessibility testing engine that integrates with various testing frameworks and provides actionable accessibility feedback.
- WAVE:
  - The Web Accessibility Evaluation Tool (WAVE) is a browser extension that provides instant accessibility analysis of web pages.
- Pa11y:
  - Pa11y is a command-line tool that helps automate accessibility testing and provides reports on issues.

Testing tools for web application development

- Code quality and continuous integration tools
- Jenkins:
  - an open-source automation server that supports building, deploying, and automating various aspects of software development, including testing.
- Travis CI:
  - cloud-based continuous integration service that automates the testing and deployment of your code.
- CircleCI:
  - continuous integration and continuous delivery (CI/CD) platform facilitates automated testing.

Content Management System (CMS)

CMS

- Over the decades, the Content Management System has seen an unprecedented growth from static web pages built on HTML to customized sites developed using PHP to give personalized experience
- Initially, in the 1990 ’ we had flat HTML files Then there was Dynamic HTML to create interactive and animated websites by using a combination of a static markup language
- Apple com at the very birth of the World Wide Web in 1992
- Then there was GeoCities a web hosting service, later acquired by Yahoo in 1999.
- During this time, GeoCities was the third most visited site on the World Wide Web It was the first kind of web based CMS that allows users to manage their website.
- This is a concise history of CMS in the 1990 s On contrary to this, 2000 ’s seen the massive development from basic HTML DHTML web pages to proprietary and open source CMSs

What is Content?

- Content is created through “editorial process”.
  - This process is what humans do to prepare information for publication to an audience
  - It involves authoring, editing, reviewing, approving, versioning, comparing, and controlling

- Content is information produced through editorial process and ultimately intended for human consumption via publication

- Content is in essence, any type or ' of digital information

- It can be text, images, graphics, video, sound, documents, records etc, or in other words, it can be anything that is likely to be stored and managed in an electronic format

CMS

- A content management system (is a software package that provides some level of automation for the tasks required to effectively manage content
- A CMS is usually server based multiuser software that interacts with content stored in a repository.
- This repository might be located on the same server, as part of the same software package, or in a separate storage facility entirely.
- A computer software system for organizing and facilitating collaborative creation of documents and other content, especially for loading to a website
- It is a web application designed to make it easy for non-technical users to add, edit and manage a website.
- It is a system for managing content in a web site that doesn’t require special software for uploading pages.

CMS

- CMSs have been available since the late 1990s
- CMSs are often used to run websites containing blogs, news, and shopping.
- Typically aim to avoid the need for hand coding.

Types of Content Management Systems

- Web content management : The management of content primarily intended for mass delivery via a website
- Enterprise content management : The management of general business content, not necessarily intended for mass delivery or consumption (e.g employee resumes, incident reports, memos, etc This flavour was more traditionally known as “document management,” but the label has been generalized over the years ECM excels in collaboration, access control, and file management.
- Digital asset management : The management and manipulation of rich digital assets such as images, audio, and video for usage in other media
- Records management : The management of transactional information and other records that are created as a by product of business operations (e.g. sales records, access records, contracts, etc)

What a CMS Does?

- Control Content
- **Permissions:** Who can see this content? Who can change it? Who can delete it
- **State management and workflow:** Is this content published? Is it in draft? Has it been archived and removed from the public
- **Versioning:** How many times has this content changed? What did it look like three months ago? How does that version differ from the current version? Can I restore or republish an older version?
- **Dependency management:** What content is being used by what other content? If I delete this content, how does that affect other content? What content is currently and unused?
- **Search and organization:** How do I find a specific piece of content? How do I find all content that refers to X? How do I group and relate content so it's easier to manage?

What a CMS Does?

- **Allow Content Reuse**
- Using content in more than one place and in more than one way increases its value
- Some examples
  - A news article appears on its own page, but also as a teaser on a category page and in multiple “Related Article” sidebars
- An author’s bio appears at the bottom of all articles written by that person
- A privacy statement appears at the bottom of every page on a website

- In these situations, this information is not created every time in every location, but simply retrieved and displayed from a common location

What a CMS Does?

- **Allow Content Automation and Aggregation**
- We can allow users to consume content in other formats, such as PDF or other ebook formats
- We can automatically create lists and navigation for our website
- We can create multiple translations of content to ensure we deliver the language most appropriate to the current user
- We can alter the content we publish in real time based on the specific behaviors and conditions exhibited by our visitors

What a CMS Does?

- **Increase Editorial Efficiency**
- The ability of editors to create and edit content quickly and accurately is enormously affected by the platform used
- Editor efficiency is increased by a system that controls what type of content editors can and can't add, what formatting tools are available to them, how their content is structured in the editing interface, how the editorial workflow and collaboration are managed, and what happens to their content after they publish
- A good CMS enables editors to publish more content in a shorter time frame (it increases "editorial throughput"), and to control and manage the published content with a lower amount of friction or drag on their process

Features of CMS

- The most important features of CMS are that you can create a dynamic website without any programming and design knowledge
- CMS is theme based which provides you options for various open source and premium design themes, which can be integrated easily without any designing knowledge
- Plugins extend the functionality of CMS, which can be used to add new required modules
- CMS sites are search engine optimization (friendly, it means sites built in CMS can be easily optimized for search engine listings
- CMS support Multilingual, which allow users to translate content in their language
- CMS has inbuilt Media Management System which is used to manage images, music, documents etc and can be used with text content

CMS

- Complete Content Management Systems
  - Drupal
  - Joomla
- **BLOGS:**
  - wordpress
  - Movable Type
  - Blogger
- **WIKIS:**
  - MediaWiki
  - Confluence
  - pmwiki

CMS

- **Static HTML: editor** Your editor constructs and helps to link to each page
- **CMS: editors are optional** Install the software on the server (hardware), then develop the site in your browser: **Chrome** or **Firefox**!!!

CMS Technologies

- **Middleware: programming language that the CMS is written in**
  - Joomla, Drupal, WordPress use **PHP**. Other middleware languages include ASP, .NET, ColdFusion, Python, Perl…
- **Database: Holds information for the website**
  - Joomla, Drupal, WordPress use **MySQL**. Other databases include MS-SQL, PostgreSQL, Oracle, etc. There are also non-relational databases like MongoDB that might be used.
- **You'll also encounter HTML, CSS, JavaScript, and occasionally XML.**

CMS

The content management system (CMS) has two elements:

- **Content management application (CMA)** is the front-end user interface that allows a user, even with limited expertise, to add, modify and remove content from a Web site without the intervention of a Webmaster.
- **Content delivery application (CDA)** compiles that information and updates the Web site.

Web CMS

- A software system that provides website authoring, collaboration, and administration tools.
- Designed to allow users with little knowledge of web programming to create and manage website content with relative ease.
- Uses a content repository or a database to store page content, metadata, and other information assets.
- Has a presentation layer (template engine) to display the content to website visitors based on a set of templates.
- Uses server side caching to improve performance.

Capabilities of a CMS

- Automated templates
- Access control
- Scalable expansion
- Easily editable content
- Scalable feature sets
- Web standards upgrades
- Collaboration
- Delegation
- Document management
- Workflow management
- Content virtualization
- Content syndication
- Multilingual
- Versioning

Advantages

- CMS is free and an open source platform under the GNU General Public License (GPL).
- Design themes customization in CMS is very easy.
- It allows you to manage users with different roles and permissions.
- MS media management is quick and easy to use.
- Good For Search Engine Optimization

Disadvantages

- Cost of implementations
- Cost of maintenance
- Latency issues
- Tool mixing
- Security

Some Popular CMS

- **Open Source CMS**
- **WordPress**
- **Joomla**
- **Drupal**
- **TYPO3**
- **Concrete5**
- **Django CMS**
- **GravCMS**
- **OpenCMS**
- **OpenWGA**
- **C1 CMS**

- **Proprietary CMS**
- **Microsoft SharePoint**
- **IBM Enterprise Content Management**
- **Pulse CMS**
- **Sitecore**
- **Shopify**

CMS


DRUPAL / WORDPRESS / JOOMLA
Drupal
Released in May 2000 by Dries Buytaert
WordPress
Released in May 2003 by Matt Mullenweg & Mike Little
Joomla
Released in September 2005 by Mambo

CMS	WordPress	Joomla	Drupal
About	WordPress is open source software you can use to create a beautiful website, blog, or app.	Joomla! Is an award-winning content management system (CMS) which enables you to build websites and powerful online applications.	Drupal is content management software. It's used to make many of the websites and applications you use every day.
Software	FREE and Open Source	FREE and Open Source	FREE and Open Source
CMS Market Share	58.90%	7.00%	4.70%
Installation	One-click Install or manual installation manually within 5 minutes	One-click Install or manual installation within 10 minutes	One-click Install or manual installation within 10 minutes
Ease of Use	Beginner-friendly (5/5)	Somewhat Beginner-friendly (4/5)	Requires Coding Skills (3.5/5)
Design (Themes & Templates)	4500+ Official FREE Themes	NO Official Template Directory	2000+ Official Drupal Themes
	9500+ Premium Themes at ThemeForest	950+ Premium Joomla Templates at ThemeForest	450+ Premium Drupal Themes at ThemeForest
Functionality (Plugins & Extensions)	50,000+ Official FREE Plugins (Thousands of Paid Plugins on the web)	7500+ Official Extensions (FREE+Paid)	37,000+ Drupal Module at Official Directory
Websites Using this Platform	Chicaco Sun Times, Vogue India, Katy Perry & More.	Michael Phelps – MP Brand, Discover Magazine, French West Indies & More.	US. Department of Energy, University of Minnesota & More.