Tech e Bytes

CSI-CSAT Technical Magazine

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"We don't do different things, We do things differently"

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

VISION OF CSE DEPARTMENT

To acquire global excellence in the field of Computer Science and Engineering, nurturing in professionals, technical competence, innovative skills, professional ethics and social commitment.

MISSION OF CSE DEPARTMENT

- To equip students with a strong foundation in the area of Computer Science and Engineering using effective teaching -learning practices.
- To provide state-of-the-art infrastructure to suit academic, industry and research needs at the global level.
- To engage students and faculty in interdisciplinary research that promotes innovative ideas for sustainable development.
- To incorporate skill enhancement programmes for students and faculty to cope with the contemporary developments in technology.
- To inculcate effective communication skills, professional ethics and social commitment among professionals through value added programs.

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2. Excel as socially committed computer engineers having mutual respect, effective communication skills, high ethical values and empathy for the needs of society.
3. Involve in lifelong learning to foster the sustainable development in the emerging areas of technology.

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Student of the Computer Science and Engineering program will:

- **PSO1**: **Professional Skills:** Attain the ability to design and develop hardware and software based systems, evaluate and recognize potential risks and provide creative solutions.
- **PSO2**: **Successful Career and Entrepreneurship:** Gain knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

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MICROSOFT HOLOLENS

By Vishnu Shenoy R (S7 CSE)

A hologram is like any other object in the real world, but instead of being made of physical matter, it is made of light. Holographic objects can be viewed from different angles and distances, just like physical objects. Hololens is High definition 3D optical head mount display with spatial sound for AR. **Microsoft HoloLens** is the first self-contained, holographic computer, enabling to engage with digital content and interact with holograms in the world around. Specialized components—like multiple sensors, advanced optics, and a custom holographic processing unit—enables to go beyond the screen. Holograms enhance the real world: interacting with holograms in mixed reality enables us to visualize and work with your digital content as part of our real world. It is developed under codename "Project Baraboo".
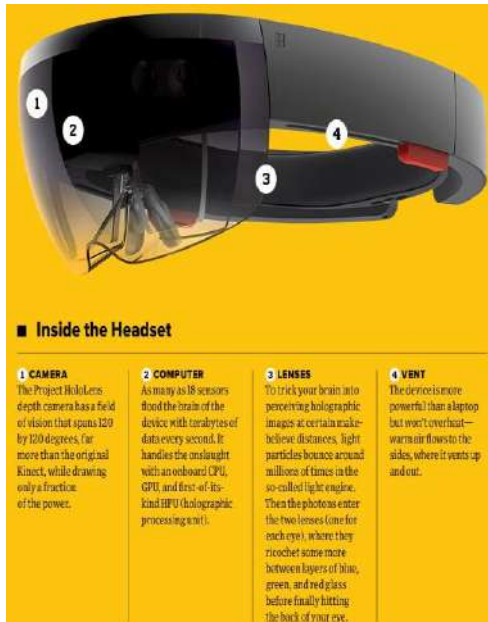
Users can interact through gaze, voice and hand gestures. Hololens supports both VR and AR. VR tricks the eyes into a virtual world. AR shows real world with graphics overlaid. AR has wide a application on the other hand VR is limited to games. The device is untethered and is self contained with windows 10 computer.

It incorporates real world with virtual elements and recognizes wearer's vocal communication, eye movement and hand gestures. It allows indoor freedom of motion. Since it runs on windows 10 platform it is easier to develop Hololens apps.

Holographic experiences with Hololens are different from existing experiences such as virtual reality (VR). VR user is completely immersed in a computer generated

reality or virtual world. Microsoft has impressed games developers with its demo of Minecraft through HoloLens in real world. Microsoft is working with NASA to put HoloLens to work on the International Space. Eg: the headset, with the aid of Skype, could guide an astronaut through a repair or experiment.


■ Inside the Headset

1 CAMERA
The Project HoloLens depth camera has a field of vision that spans 120 by 120 degrees, far more than the original Kinect, while drawing only a fraction of the power.

2 COMPUTER
As many as 18 sensors flood the brain of the device with terabytes of data every second. It handles the onslaught with an onboard CPU, GPU, and first-of-its-kind HPU (holographic processing unit).

3 LENSES
To trick your brain into perceiving holographic images at certain make-believe distances, light particles bounce around millions of times in the so-called light engine. Then the photons enter the two lenses (one for each eye), where they ricochet some more between layers of blue, green, and red glass before finally hitting the back of your eye.

4 VENT
The device is more powerful than a laptop but won't overheat—warm air flows to the sides, where it vents up and out.

DESIGN

Visor glasses unit connected to an adjustable padded inner headband. The unit can be tilted up and down, as well as adjusted forward and backward. HoloLens is projected to weigh around 0.4 kg. Adjustment wheel at the back of the headband. It includes depth sensors, photo/video camera, and holographic processing unit. Along bottom edges of side arms are a pair of small red stereo speakers. On top edge are two pairs of buttons: Display brightness buttons above the left ear and Volume buttons above the right ear. At the end of the left arm is a power button and row of five tiny LEDs used to indicate system status and power management, battery level, setting power standby mode. A micro USB receptacle for charging and connectivity is located along the bottom edge.

- Energy-efficient depth camera with a 120°×120° angle of view.
- Microphone array, a photographic video camera, and an inertial measurement unit (IMU).
- IMU includes accelerometer, gyroscope and magnetometer.
- Holographic Processing Unit (HPU) in addition to CPU and GPU.
- Custom coprocessor from Microsoft which efficiently processes and integrates data from various sensors.
- Handling tasks such as gesture, voice and speech recognition.
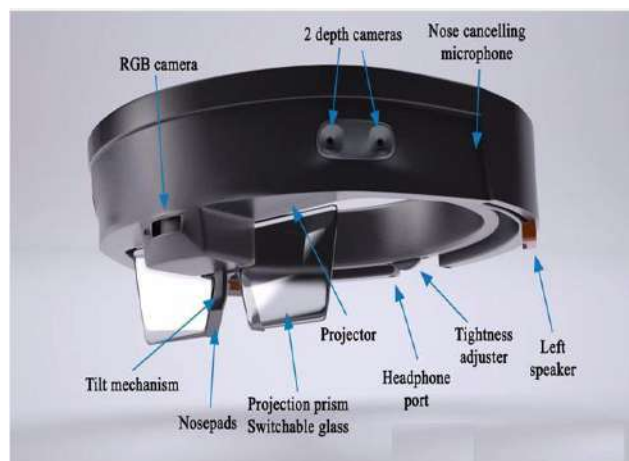
APPLICATIONS

Holostudio: 3D modeling application, Produce output for 3D printers.

Onsight - mission planning with users able to program rover activities by looking at a target.

Skype - video chatting

- ○ *Refrences: https://www.microsoft.com/microsoft-hololens*

WINDOWS 10

By Arun Mathew (S7 CSE)

Windows 10 is a personal computer operating system developed and released by Microsoft as part of the Windows NT family of operating systems. It was first released on July 29, 2015. Unlike previous versions of Windows, Microsoft has branded Windows 10 as a "service" that receives ongoing "feature updates". Devices in enterprise environments can receive these updates at a slower pace, or use long-term support milestones that only receive critical updates, such as security patches, over their ten-year lifespan of extended support.

Windows 10 introduces what Microsoft described as "universal apps"; expanding on Metro-style apps, these apps can be designed to run across multiple Microsoft product families with nearly identical code—including PCs, tablets, smartphones, embedded systems, Xbox One, Surface Hub and Mixed Reality. The Windows user interface was revised to handle transitions between a mouse-oriented interface and a touchscreen-optimized interface based on available input devices—particularly on 2-in-1 PCs; both interfaces include an updated Start menu which incorporates elements of Windows 7's traditional Start menu with the tiles of Windows 8. The first release of Windows 10 also introduces a virtual desktop system, a window and desktop management feature called Task View, the Microsoft Edge web browser, support for fingerprint and face recognition login, new security features for enterprise environments, and DirectX 12 and WDDM 2.0 to improve the operating system's graphics capabilities for games.
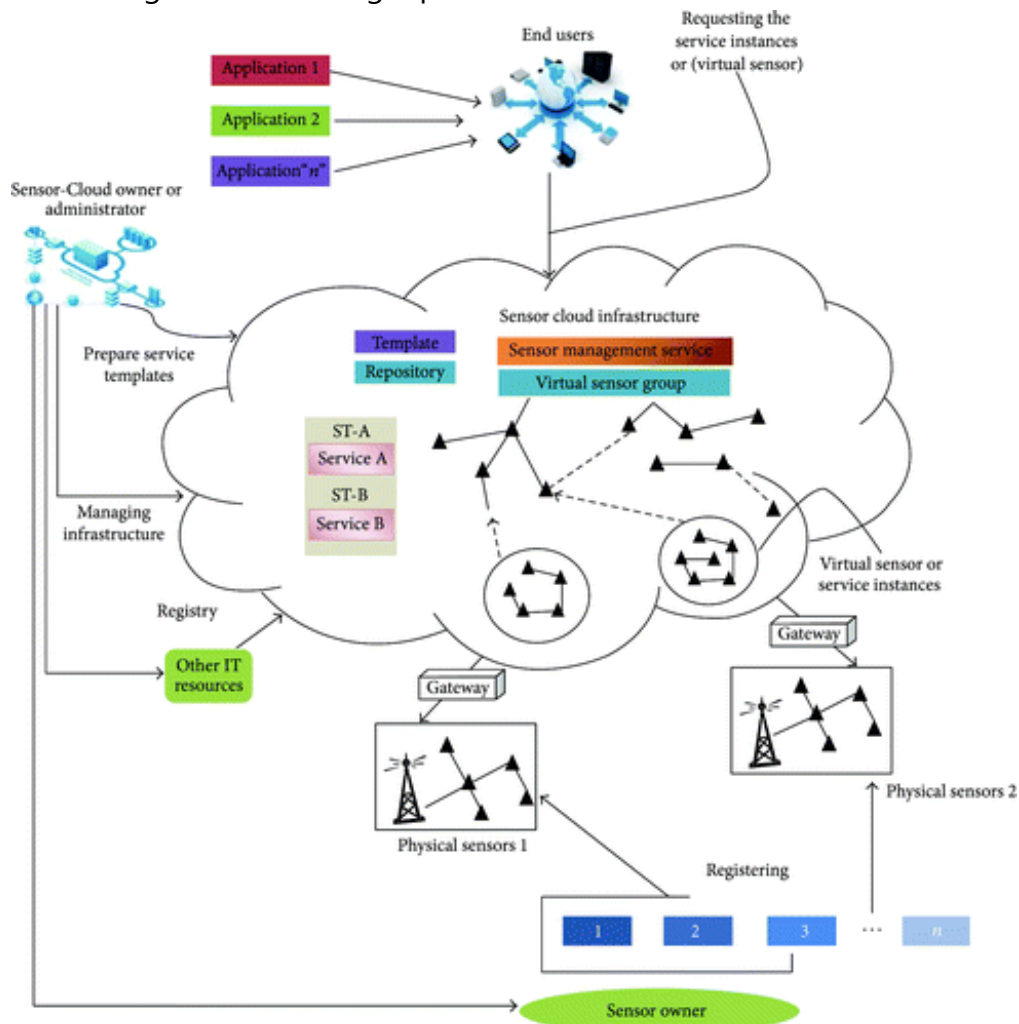
IoT SENSOR CLOUD

By Kripa Radhakrishnan (S7 CSE)

Sensor-Cloud is a new paradigm for cloud computing that uses the physical sensors to accumulate its data and transmit all sensor data into a cloud computing infrastructure. Sensor-Cloud handles sensor data efficiently, which is used for many monitoring applications. According to IntelliSys, Sensor-Cloud can be defined as follows: An infrastructure that allows truly pervasive computation using sensors as an interface between physical and cyber worlds, the data-compute clusters as the cyber backbone and the internet as the communication medium.

A Sensor-Cloud collects and processes information from several sensor networks, enables information sharing on big scale, and collaborates with the applications on cloud among users. It integrates several networks with a number of sensing applications and cloud computing platform by allowing applications to be cross-disciplinary that may span over multiple organizations [17]. Sensor-Cloud enables users to easily gather, access, process, visualize, analyze, store, share, and search for a large number of sensor data from several types of applications and by using the computational IT and storage resources of the cloud.

In a sensor network, the sensors are utilized by their specific application for a special purpose, and this application handles both the sensor data and the sensor itself such that other applications cannot use this. This makes wastage of valuable sensor resources that may be effectively utilized when integrating with other application's infrastructure. To realize this scenario, Sensor-Cloud infrastructure is used that enables the sensors to be utilized on an IT infrastructure by virtualizing the physical sensor on a cloud computing platform. These virtualized sensors on a cloud computing platform are dynamic in nature and hence facilitate automatic provisioning of its services as and when required by users [19]. Furthermore, users need not to worry about the physical locations of multiple physical sensors and the gapping between physical sensors; instead, they can supervise these virtual sensors using some standard functions. Within the Sensor-Cloud infrastructure, to obtain QoS, the virtual sensors are monitored regularly so users can destroy their virtual sensors when they becomes meaningless. A user interface is provisioned by this Sensor-Cloud infrastructure for administering, that is, for controlling or monitoring the virtual sensors, provisioning and destroying virtual sensors, registering and deleting of physical sensors, and for admitting the deleting users. For example, in a health monitoring environment, a patient may use a wearable computing system

(that may include wearable accelerometer sensors, proximity sensors, temperature sensors, etc.) like Life Shirt and Smart Shirt or may use a handheld device loaded with sensors, and consequently the data captured by the sensors may be made accessible to the doctors. But out of these computing systems, active continuous monitoring is most demanding, and it involves the patient wearing monitoring devices to obtain pervasive coverage without being inputted or intervened.

Sensor-Cloud infrastructure provides service instances (virtual sensors) automatically to the end users as and when requested, in such a way that these virtual sensors are part of their IT resources (like disk storage, CPU, memory, etc.). These service instances and their associated appropriate sensor data can be used by the end users via a user interface through the web crawlers.

USB 3.1, TYPE C

By R ADITHYA NAIK (S7 CSE)

USB-C, technically known as USB Type-C, is a 24-pin USB connector system, which is distinguished by its horizontally symmetrical "reversible" connector. The USB Type-C Specification 1.0 was published by the USB Implementers Forum (USB-IF). The USB-C connectors connect to both hosts and devices, replacing various USB-B and USB-A connectors and cables with a standard meant to be future-proof. The 24-pin double-sided connector is slightly larger than the micro-B connector, with a USB-C port measuring 8.4 millimetres (0.33 in) by 2.6 millimetres (0.10 in). The connector provides four power/ground pairs, two differential pairs for non-SuperSpeed data (though only one pair is populated in a USB-C cable), four pairs for SuperSpeed data bus (only two pairs are used in USB 3.1 mode), two "sideband use" pins, VCONN +5 V power for active cables, and a configuration pin used for cable orientation detection and dedicated biphase mark code (BMC) configuration data channel.

Connecting an older device to a host with a USB-C receptacle requires a cable or adapter with a USB-A or USB-B plug or receptacle on one end and a USB-C plug on the other end. Legacy adapters with a USB-C receptacle are "not defined or allowed" by the specification because they can create "many invalid and potentially unsafe" cable combinations.

Devices may be hosts or peripherals. Some, such as mobile phones, can take either role depending on what kind is detected on the other end. These types of ports are called Dual-Role-Data (DRD). When two such devices are connected, the roles are randomly assigned but a swap can be commanded from either end. Furthermore, dual-role devices that implement USB Power Delivery may independently and dynamically swap data and power roles using the Data Role Swap or Power Role

Swap processes. This allows for charge-through hub or docking station applications where the Type-C device acts as a USB data host while acting as a power consumer rather than a source.

USB-C devices may optionally provide or consume bus power currents of 1.5 A and 3.0 A (at 5 V) in addition to baseline bus power provision; power sources can either advertise increased USB current through the configuration channel, or they can implement the full USB Power Delivery specification using both BMC-coded configuration line and legacy BFSK-coded VBUS line.

USB-C 3.1 cables are considered full-featured USB-C cables. They are electronically marked cables that contain a chip with an ID function based on the configuration channel and vendor-defined messages (VDM) from the USB Power Delivery 2.0 specification. Cable length should be ≤ 2 m for Gen 1 or ≤ 1 m for Gen2. Electronic ID chip provides information about product/vendor, cable connectors, USB signalling protocol (2.0, Gen1, Gen 2), passive/active construction, use of VCONN power, available VBUS current, latency, RX/TX directionality, SOP controller mode, and hardware/firmware version . USB-C 2.0 cables do not have shielded SuperSpeed pairs, sideband use pins, or additional wires for power lines. Increased cable lengths up to 4 m are possible. All USB-C cables must be able to carry a minimum of 3 A current (up to 60 W @20V) but can also carry high-power 5 A current (up to 100 W). All USB-C to USB-C cables must contain e-marker chips programmed to identify the cable and its current capabilities. USB Charging ports should also be clearly marked with capable power wattage.
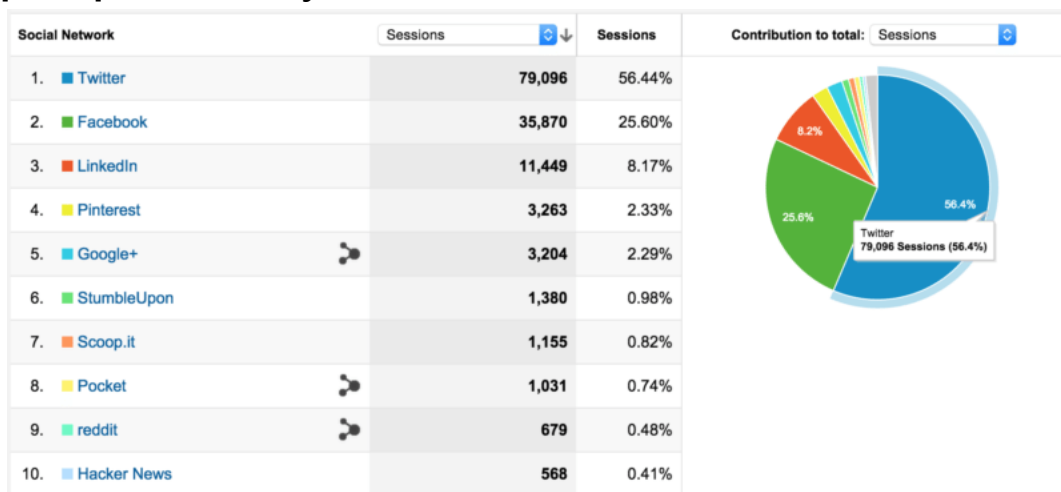
GOOGLE ANALYTICS

By Shehnaz P J (S7 CSE)

gOogle Analytics is arguably one of the most powerful web analytics applications available today. The fact that, like many Google offerings, it's an entirely free program, makes it even more appealing. Google Analytics was originally developed from the Urchin on Demand software that Google acquired in the spring of 2005 (Urchin is still developed and available through value-added resellers, and is currently at version 7). The first Google-branded version was released in November 2005. In 2006, further ideas from Measure Map (developed by Adaptive Path) were integrated into Analytics when Google acquired them. Analytics is a powerful application for tracking traffic patterns on your website. The fact that it's an entirely free program, and integrates with other Google programs, like AdSense and AdWords, only makes it that much more valuable. Considering most people already use at least some Google products, it makes sense to use Analytics, because it is such a powerful, yet easy-to-use, product.

Sample Report: Traffic by social channel

Social Network	Sessions	Sessions
1. ■ Twitter	79,096	56.44%
2. ■ Facebook	35,870	25.60%
3. ■ LinkedIn	11,449	8.17%
4. ■ Pinterest	3,263	2.33%
5. ■ Google+	3,204	2.29%
6. ■ StumbleUpon	1,380	0.98%
7. ■ Scoop.it	1,155	0.82%
8. ■ Pocket	1,031	0.74%
9. ■ reddit	679	0.48%
10. ■ Hacker News	568	0.41%

At-a-glance, we can see which social network sends you the most visits to your website. For instance, Twitter sent the Buffer blog 79,096 visitors last month. We can view the data in a pie chart to see how the networks break down as an overall percentage of social traffic to your site. For instance, Twitter accounted for 56 percent of social traffic to the Buffer blog. Twitter and Facebook combined accounted for 81 percent. We can expand the results to show 25 or 50 channels, then change the date range to include a comparison to last period. Now we can identify networks beyond our main ones that are beginning to send u more and more traffic.

DAKNET

By Nidhi Nambiar C K (S7 CSE)

A DAKNET is an asynchronous ad-hoc network developed at the MIT labs. It ccombines transportation with wireless data transfer to extend internet connectivity to rural areas and connects villages lacking a communication infrastructure. Daknet costs two times less than traditional landline solutions. It can tTransmit data between short point to point links kiosks and mobile access point.

The main parts of daknet:

- Kiosk
- Mobile Access Point
- Hub

Kiosk: Kiosk refers to computer centers, systems are installed for the villagers and is used under the guidance of a computer literate person. Directional or omni directional antennas are located at each of the kiosks. Amplifiers are used to boost the signal

Mobile Access Points (MAP): MAP equipment is installed on a vehicle which moves in a village from kiosk to kiosk or from kiosk to hub. It automatically and wirelessly collects and delivers data from/to each kiosk. Low cost WIFI radio transceivers automatically transfer the data stored in the MAP based on store-and-forward connectivity.

Hub: It contains multiple ports, and serve as common connection point for devices in a network. It connect segments of a LAN. Packet at one port copied to all other ports. When the vehicle passes near the hub- it synchronizes all the data from different kiosks.

Working:
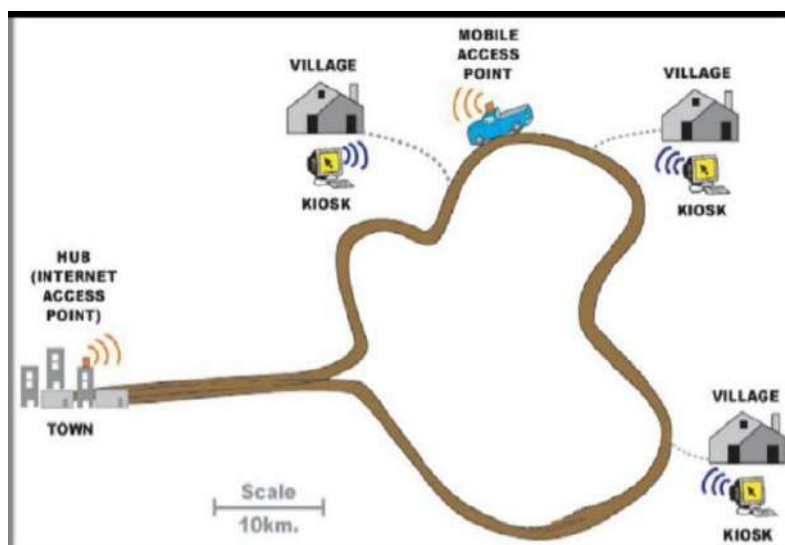
Based on store-and-forward WiFi system using a government bus as a central linkage. The bus contains a simple WiFi installation and server, it does away with base stations.

1) As MAP comes within the range of a kiosk it automatically uploads and downloads tens of mega bytes of data.

2) As it comes in the range of Internet access points (the hub) it automatically synchronizes the data from kiosks using the Internet.

'These steps repeat for all the vehicles carrying MAP'

DAKNET IN ACTION

Daknet has been implemented in:

- BHOOMI Initiative in Karnataka
- Ratnakiri Project In Combodia
- SARI (Sustainable Access for Rural India) project of Tamilnadu

jQUERY

By Jerin A Methews (S7 CSE)

jQuery Overview

jQuery is a fast and concise JavaScript Library created by John Resig in 2006 with a nice motto – **Write less, do more**. jQuery simplifies HTML document traversing, event handling, animating, and Ajax interactions for rapid web development. jQuery is a JavaScript toolkit designed to simplify various tasks by writing less code.

LEARN JQUERY
web application library

Core features supported by jQuery –

- **DOM manipulation** – The jQuery made it easy to select DOM elements, traverse them and modifying their content by using cross-browser open source selector engine called **Sizzle**.
- **Event handling** – The jQuery offers an elegant way to capture a wide variety of events, such as a user clicking on a link, without the need to clutter the HTML code itself with event handlers.
- **AJAX Support** – The jQuery helps you a lot to develop a responsive and feature-rich site using AJAX technology.
- **Animations** – The jQuery comes with plenty of built-in animation effects which you can use in your websites.

- **Lightweight** – The jQuery is very lightweight library - about 19KB in size (Minified and gzipped).
- **Cross Browser Support** – The jQuery has cross-browser support, and works well in IE 6.0+, FF 2.0+, Safari 3.0+, Chrome and Opera 9.0+
- **Latest Technology** – The jQuery supports CSS3 selectors and basic XPath syntax.

How to use jQuery?

There are two ways to use jQuery.

- **Local Installation** – You can download jQuery library on your local machine and include it in your HTML code.
- **CDN Based Version** – You can include jQuery library into your HTML code directly from Content Delivery Network (CDN).

Local Installation

- Go to the https://jquery.com/download/ to download the latest version available.
- Now put downloaded **jquery-2.1.3.min.js** file in a directory of your website, e.g. /jquery.

Example

Now you can include *jquery* library in your HTML file as follows –

```
<html>
   <head>
      <title>The jQuery Example</title>
      <script type = "text/javascript"  src = "/jquery/jquery-
2.1.3.min.js"></script>
      <script type = "text/javascript">
         $(document).ready(function(){
            document.write("Hello, World!");
         });
      </script>
   </head>
   <body>
      <h1>Hello</h1>
   </body>
</html>
```

This will produce the result – Hello, World!

How to call a jQuery library functions?

As almost everything we do when using jQuery reads or manipulates the document object model (DOM), we need to make sure that we start adding events etc. as soon as the DOM is ready. If you want an event to work on your page, you should call it inside the $(document).ready() function. Everything inside it will load as soon as the DOM is loaded and before the page contents are loaded.

To do this, we register a ready event for the document as follows –

```
$(document).ready(function() {
    // do stuff when DOM is ready
});
```

The Document Object Model

The Document Object Model is a tree structure of various elements of HTML as follows –

```
<html>
    <head>
        <title>The jQuery Example</title>
    </head>
    <body>
        <div>
            <p>This is a paragraph.</p>
            <p>This is second paragraph.</p>
            <p>This is third paragraph.</p>
        </div>
    </body>
</html>
```

This will produce following result –

This is a paragraph.

This is second paragraph.

This is third paragraph.

Following are the important points about the above tree structure –

- The <html> is the ancestor of all the other elements; in other words, all the other elements are descendants of <html>.
- The <head> and <body> elements are not only descendants, but children of <html>, as well.
- Likewise, in addition to being the ancestor of <head> and <body>, <html> is also their parent.
- The <p> elements are children (and descendants) of <div>, descendants of <body> and <html>, and siblings of each other <p> elements.

While learning jQuery concepts, it will be helpful to have understanding on DOM.

RESTFUL WEB SERVICES

By Jishnu Vijayan (S7 CSE)

Representational State Transfer (REST) is a software architecture style consisting of guidelines and best practices for creating scalable web services. REST is a coordinated set of constraints applied to the design of components in a distributed hypermedia system that can lead to a more performant and maintainable architecture. RESTful systems typically, but not always, communicate over the Hypertext Transfer Protocol with the same HTTP verbs (GET, POST, PUT, DELETE, etc.) used by web browsers to retrieve web pages and send data to remote servers. REST interfaces usually involve collections of resources with identifiers, for example /people/paul, which can be operated upon using standard verbs, such as DELETE /people/paul. The REST architectural style was developed by W3C Technical Architecture Group (TAG) in parallel with HTTP 1.1, based on the existing design of HTTP 1.0. The World Wide Web itself represents the largest implementation of a system conforming to the REST architectural style.

RESTful web services are built to work best on the Web. In the REST architectural style, data and functionality are considered resources and are accessed using Uniform Resource Identifiers (URIs), typically links on the Web. The resources are acted upon by using a set of simple, well-defined operations. The REST architectural style constrains an architecture to a client/server architecture and is designed to use a stateless communication protocol, typically HTTP. In the REST architecture style, clients and servers exchange representations of resources by using a standardized interface and protocol. REST architecture involves reading a designated Web page that contains an XML/JSON file. The XML/JSON file describes and includes the desired content. Once dynamically defined, consumers may access the interface.

In a RESTful Web service, requests made to a resource's URI will elicit a response that may be in XML, HTML, JSON or some other defined format. The response may confirm that some alteration has been made to the stored resource, and it may provide hypertext links to other related resources or collections of resources. Using HTTP, as is most common, the kind of operations available include those predefined by the HTTP methods GET, POST, PUT, DELETE and so on. By using a stateless protocol and standard operations, REST systems aim for fast performance, reliability, and the ability to grow, by re-using components that can be managed and updated without affecting the system as a whole, even while it is running.

The term representational state transfer was introduced and defined in 2000 by Roy Fielding in his doctoral dissertation. Fielding used REST to design HTTP 1.1 and Uniform Resource Identifiers (URI). The term is intended to evoke an image of how a well-designed Web application behaves: it is a network of Web resources (a virtual state-machine) where the user progresses through the application by selecting links, such as /user/tom, and operations such as GET or DELETE (state transitions), resulting in the next resource (representing the next state of the application) being transferred to the user for their use.

SELENIUM

By Merin K Joy (S7 CSE)

Selenium is an open-source and a portable automated software testing tool for testing web applications. It has capabilities to operate across different browsers and operating systems. Selenium is not just a single tool but a set of tools that helps testers to automate web-based applications more efficiently.

Following are the tools available in the Selenium suite and their usage.

Sr.No.	Tool & Description
1	**Selenium IDE** Selenium **I**ntegrated **D**evelopment **E**nvironment (IDE) is a Firefox plugin that lets testers to record their actions as they follow the workflow that they need to test.
2	**Selenium RC** Selenium **R**emote **C**ontrol (RC) was the flagship testing framework that allowed more than simple browser actions and linear execution. It makes use of the full power of programming languages such as Java, C#, PHP, Python, Ruby and PERL to create more complex tests.
3	**Selenium WebDriver** Selenium WebDriver is the successor to Selenium RC which sends commands directly to the browser and retrieves results.
4	**Selenium Grid** Selenium Grid is a tool used to run parallel tests across different machines and different browsers simultaneously which results in minimized execution time.

Advantages of Selenium

QTP and Selenium are the most used tools in the market for software automation testing. Hence it makes sense to compare the pros of Selenium over QTP.

Selenium	QTP
Selenium is an open-source tool.	QTP is a commercial tool and there is a cost involved in each one of the

	licenses.
Can be extended for various technologies that expose DOM.	Limited add-ons and needs add-ons for each one of the technologies.
Has capabilities to execute scripts across different browsers.	Can run tests in specific versions of Firefox , IE, and Chrome.
Can execute scripts on various operating systems.	Works only with Windows.
Supports mobile devices.	Supports mobile devices with the help of third-party tools.
Executes tests within the browser, so focus is NOT required while script execution is in progress.	Needs Focus during script execution, as the tool acts on the browser (mimics user actions).
Can execute tests in parallel with the use of Selenium Grids.	QTP cannot execute tests in parallel, however integrating QTP with QC allows testers to execute in parallel. QC is also a commercial tool.

Disadvantages of Selenium

Selenium	QTP
Supports only web based applications.	Can test both web and desktop applications.
No feature such as Object Repository/Recovery Scenario	QTP has built-in object repositories and recovery scenarios.
No IDE, so the script development won't be as fast as QTP.	More intuitive IDE; automation can be achieved faster.
Cannot access controls within the browser.	Can access controls within the browser such as favorites bar, backward, and forward buttons.

No default test report generation.	Default test result generation within the tool.
For parameterization, users has to rely on the programming language.	Parameterization is built-in and easy to implement.

The Selenium-IDE (Integrated Development Environment) is an easy-to-use Firefox plug-in to develop Selenium test cases. It provides a Graphical User Interface for recording user actions using Firefox which is used to learn and use Selenium, but it can only be used with Firefox browser as other browsers are not supported.

However, the recorded scripts can be converted into various programming languages supported by Selenium and the scripts can be executed on other browsers as well.

HIBERNATE

By Meenakshi Suresh (S7 CSE)

Hibernate is a high-performance Object/Relational persistence and query service, which is licensed under the open source GNU Lesser General Public License (LGPL) and is free to download. It is an Object-Relational Mapping (ORM) solution for JAVA. It is an open source persistent framework created by Gavin King in 2001. It is a powerful, high performance Object-Relational Persistence and Query service for any Java Application. Hibernate not only takes care of the mapping from Java classes to database tables (and from Java data types to SQL data types), but also provides data query and retrieval facilities.

Hibernate maps Java classes to database tables and from Java data types to SQL data types and relieves the developer from 95% of common data persistence related programming tasks.

Hibernate sits between traditional Java objects and database server to handle all the works in persisting those objects based on the appropriate O/R mechanisms and patterns.

Hibernate Advantages

- Hibernate takes care of mapping Java classes to database tables using XML files and without writing any line of code.
- Provides simple APIs for storing and retrieving Java objects directly to and from the database.
- If there is change in the database or in any table, then you need to change the XML file properties only.
- Abstracts away the unfamiliar SQL types and provides a way to work around familiar Java Objects.
- Hibernate does not require an application server to operate.
- Manipulates Complex associations of objects of your database.
- Minimizes database access with smart fetching strategies.
- Provides simple querying of data.

Supported Databases

Hibernate supports almost all the major RDBMS. Following is a list of few of the database engines supported by Hibernate –

- HSQL Database Engine
- DB2/NT
- MySQL
- PostgreSQL
- FrontBase
- Oracle
- Microsoft SQL Server Database
- Sybase SQL Server
- Informix Dynamic Server

Supported Technologies

Hibernate supports a variety of other technologies, including –

- XDoclet Spring
- J2EE
- Eclipse plug-ins
- Maven

SAP- ABAP

By Sandra J (S7 CSE)

ABAP stands for Advanced Business Application Programming, a 4GL (4th generation) language. Currently it is positioned, along with Java, as the main language for SAP application server programming. The 3-tier Client/Server architecture of a typical SAP system is depicted as follows.
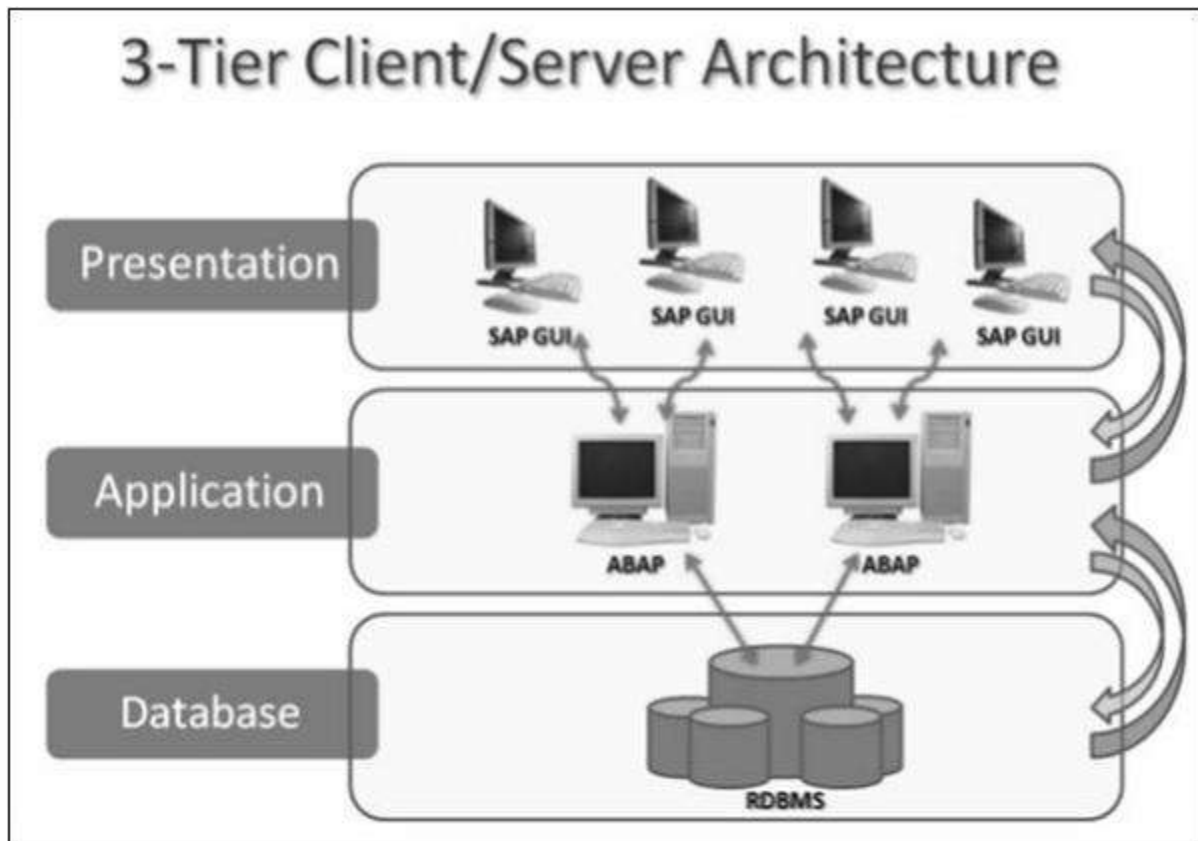
The **Presentation layer** consists of any input device that can be used to control SAP system. This could be a web browser, a mobile device and so on. All the central processing takes place in **Application server**. The Application server is not just one system in itself, but it can be multiple instances of the processing system. The server communicates with the **Database layer** that is usually kept on a separate server, mainly for performance reasons and also for security. Communication happens between each layer of the system, from the Presentation layer to the Database and then back up the chain.

Note – ABAP programs run at the application server level. Technical distribution of software is independent of its physical location. It means basically all three levels can be installed on top of each other on one computer or each level can be installed on a different computer or a server.

ABAP programs reside inside the SAP database. They execute under the control of the runtime system that is a part of the SAP kernel. The run-time system processes all ABAP statements, controlling the flow logic and responding to user events.

So, unlike C++ and Java, ABAP programs are not stored in separate external files. Inside the database, ABAP code exists in two forms –

- **Source** code that can be viewed and edited with the ABAP workbench tools.
- **Generated code**, which is a binary representation. If you are familiar with Java, this generated code is somewhat comparable with Java byte code.

The run-time system can be considered as a virtual machine, just similar to Java virtual machine. A key component of the ABAP run-time system is the database interface that turns database independent statements (Open SQL) into the statements understood by the underlying database (Native SQL). SAP can work with a wide variety of databases and the same ABAP program can run on all of those.