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**ADDIS ABABA INSTITUTE OF TECHNOLOGY**

**CENTER OF INFORMATION TECHNOLOGY AND SCIENTIFIC COMPUTING**

**DEPARTMENT OF** **SOFTWARE ENGINEERING**

FUNDAMENTALS OF WEB DESIGN AND DEVELOPMENT

ASSIGNMENT 1

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History of Internet

Internet has come a long way in a short period of time. There are many elements allow that fast evolution of Internet. For instance, one of them is cold war beginnings influence its design to decentralized, indestructible communication network; development of rule of communication for computers that enable the machines to turn raw data into useful information.

The US Department of Defense had created the Advanced Research Projects Agency known as ARPA, to keep its technology a step ahead of the soviets. A computer enthusiast named Joseph Licklider helped convince ARPA to fund research into a computer network connecting scientists and engineers throughout the country. A few key colleges agreed to be involved, and ARPA started building the network in 1969. They called it ARPANET. It started fairly small, as a sort of messaging service between computers at UCLA, UC Santa Barbara, Stanford University, and the University of Utah. But it was the first network of its kind. As ARPANET grew over the next couple decades, its engineers would add features and solve problems that still shape everything we do online. One of ARPANET’s first big innovations was what is known as packet switching.

Computer would only be able to connect to one other computer at a time, and it would take extra time whenever you tried to connect somewhere else. Some modern websites might connect you to ten different computers from around the world at the same time. All of them need to respond immediately if you click, all the while connecting and monitoring hundreds or thousands of other visitors at once. So circuits all over the place would constantly be flipping around, connecting somewhere for a split second before switching away and connecting elsewhere. It just would not work. Even back in the 1960s, engineers knew that computers send messages far too quickly to make circuit switching practical. So instead, they invented an alternative packet switching, where different computers send messages along the same set of wires instead of each getting one. To communicate with each other, they just send a message, called a packet, along the wires. Every packet had a kind of address label, a string of numbers representing the computers where it was headed. The computer where it started would look up the address on a table with all the addresses in the network on it, and then send the packet toward whatever nearby computer was closest to the destination. The second computer would get the packet, look up the destination address, and again send the packet in the right direction. This process would repeat over and over until the packet finally got where it is going. No moving circuits or wires, no one conversation at a time requirement.

ARPANET used packet switching from the start, and its packets traveled over phone lines. At first, packet switching worked exactly as planned, but there were problems over the next couple of years as dozens of new computers from around the country joined because the way the packet switching system was set up meant that every computer always had to keep an updated list of all the other computers’ addresses. Otherwise, they would get packets and would not know where to send them, or they would try to send the packet somewhere that might not be around anymore, but the network kept getting bigger and bigger, and sometimes a computer’s address might change if they temporarily disconnected from the network or a connection stopped working. Different computers ended up with different address books if they did not update fast enough. ARPANET’s engineers scrapped that system and selected Stanford as the official record keeper of everyone’s address in 1973. This quick fix let ARPANET keep growing throughout the seventies with sixty computers in 1974 and over a hundred by 1977.

By the mid-seventies, ARPANET was not the only network in town. Similar networks were popping up around the world, and some had even more computers on them, but everyone formatted their packets differently even though you could connect different networks together, it was a real headache. The problem was mostly solved back in 1974, but it took until the early eighties before ARPANET and most of the other networks started using it. The solution was a set of programs called TCP/IP, which we still use today. The Transmission Control Protocol (TCP) was a standard way of formatting packets, so that everyone was speaking the same language. Internet Protocol (IP) was a standard way of assigning addresses, so there was not any confusion about where packets where headed. Once two networks used TCP/IP, connecting them became way easier.

Transmission Control Protocol (TCP) is one of the main protocols of the Internet protocol suite. It is connection oriented protocol which enables two hosts to establish a connection and exchange streams of data. It establishes the rules and standard procedures for the way information is communicated over the internet. It also guarantees transmission of data and helps the packets will be delivered in the same order in which they were sent. Internet Protocol (IP) is the address system of the internet which helps to deliver packets of information from the server to the client. IP is the part that obtains the address to which data is sent.

All the different networks were connected to one another forming what became known as the Internet – with ARPANET as the glue holding it all together, but with ARPANET growing so quickly and connecting to so many other networks, the record keepers at Stanford were getting overloaded. Hosts were always joining and changing addresses and trying to download the updated address book and occasionally the Stanford list would have errors that messed up communication throughout the network, and sending emails was becoming a real pain. Email was invented back in 1971, and by 1973 emails made up more than three quarters of ARPANET’s packets, but different computers had different email programs, and some required a list of every computer it would pass between sender and receiver, so people had to keep an updated map of the entire network by their desk and they had to type out the path of their email before they could send it. Hundreds of computers on ARPANET and over a thousand across the Internet keeping up those maps was getting impossible. Because of that ARPANET’s engineers realized that the entire structure of the Internet had to be reorganized, so they came up with the Domain Name System or DNS.

Domain Name System (DNS) is just the phonebook of the internet. It is one of the most fundamental instruments of the internet which translates domain names to IP addresses so browsers can load Internet resources. The process of DNS involves converting a hostname into IP address.

Instead of separating each host and storing their addresses in a random order, the hosts were arranged into domains. First came the top-level domains. Those dot-coms and dot-edus at the end of every website and email address. The new top level domains meant that instead of sending an email to me@example like you would have before DNS, you were emailing [me@example.com](mailto:me@example.com). Then, within these top-level domains, each host was called a second-level domain. So “aau.edu”, for example, now meant “the second-level domain ‘aau’ within the top level domain ‘dot-edu’”. The domain structure organized all those different hosts from all around the world in a way that computers could handle. Then, DNS added a whole new network to the Internet, whose whole job was to keep track of addresses and connections. One computer on the new network effectively stored all addresses within the dot-com top-level domain, another got all the dot-edus, and another got all the dot-orgs, and so on. Other new computers collectively mapped out the entire network, so when you wanted to send an email, you did not have to check your map and plan out all the connections yourself. That became the DNS’s job and it’s still the DNS’s job today. That is why your computer did not know how to get a message to YouTube when you clicked on different videos.