March 17th, 2012 | COMM 101
Informative Speech
Complete Sentence Outline | Colby Blair

1. Introduction
    a. The amount of scientific data is growing exponentially.
    b. Computing power in CPU's, however, is no longer able to keep up.
    c. The result is a huge gap opening between researchers and results.
    d. Without the ability to process all this new data, we're left with a situation where the answers to big problems like Cancer, Alzheimer's, and more, remain unanswered
    e. The scientific community needs to invest less heavily in computing equipment, and more heavily in staff to build it
2. Body
    a. Main Point 1 - Scientific Data continues to grow exponentially.
        i. In Alexander Szalay and Jim Gray's paper **2020 Computing: Science in an exponential world** [1]**,** the amount of scientific data is doubling every 2 years.
        ii. While I worked at IBEST at the U of I, data use was 20 TB and growing.
        iii. In a talk by my boss James Foster, under 10% of this data was used in final research [2].
    b. Main Point 2 - CPU power is now more dependent on the cloud, and less on CPUs alone.
        i. Back in 1965, then Fairchild and later Intel Engineer Gordon Moore declared his famous **Moore's Law**.
        ii. Moore's Law stated that the density of transistors on a chip doubled every 2 years [3].

iii. The power of CPU's, therefore, doubled at roughly the same rate.

iv. The growth continued for roughly 40 years, until it was declared dead due to the transistors approach to the size of an atom.

v. Who boldly declared the law dead? Gordon Moore.

c. Main Point 3 - Processing power growth can no longer keep up on CPU chips.

i. The result is the deployment of High Performance Compute Clusters (HPCC).

ii. HPCC's are groups of computers that create one huge CPU.

iii. There are also amazingly complicated, and require huge amounts of man power to run.

3. Conclusion
    a. Scientific research is in dire need of more processing power.
    b. The ability to collect data will quickly be eclipsed by the inability to analyze it.
    c. The answers to diseases, hereditary disorders, and more lie in the balance.
    d. The data deluge will keep the next generation of researchers from making the advances similar to those made in the last 40 years.
    e. People disciplined in computers are needed to solve these questions.
    f. Still, grants like those in the NSF and NIH favor funding data collection.
    g. Little thought is give to actually analyzing the data.
    h. Research will become less and less meaningful if the problem of CPU is not answered soon.

Bibliography

1. Szalay, Alex; Gray, Jim. “2020 Computing: Science in an exponential world”. *Nature* 440, 413-414 (23 March 2006)

2. Foster, James. *Visualizing Human Microbiome Ecosystems*. University of Idaho:

Computer Science Colloquium, December 7th 2010. Seminar.

3. Manek Dubash (2005-04-13). ”Moore’s Law is dead, says Gordon Moore”. *Techworld*.

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