CSE 112: Computer Organization (Section A)

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Lecture 2

IIITD

INDRAPRASTHA INSTITUTE *of*
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AMS Lab @IIITD

Agenda
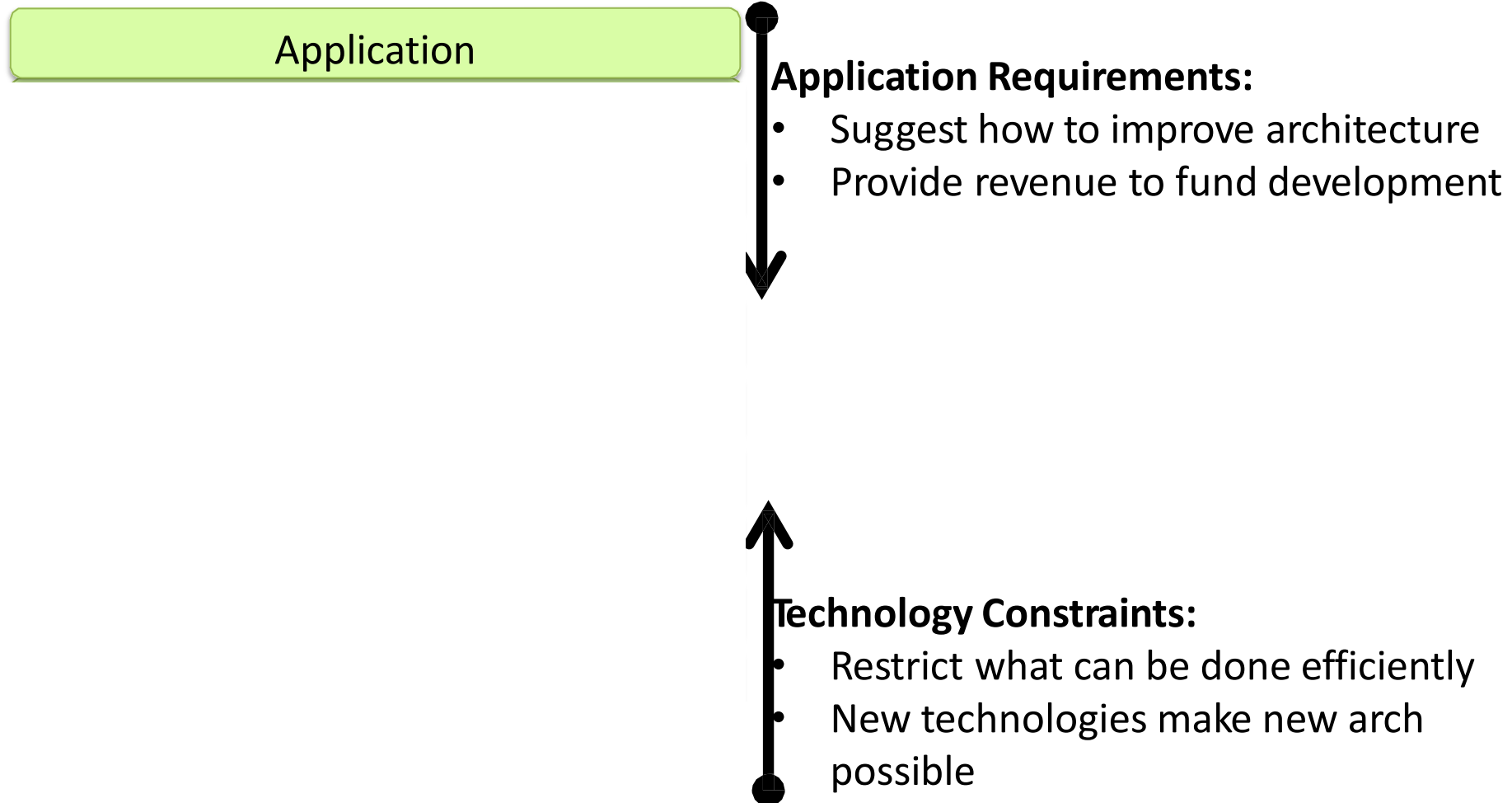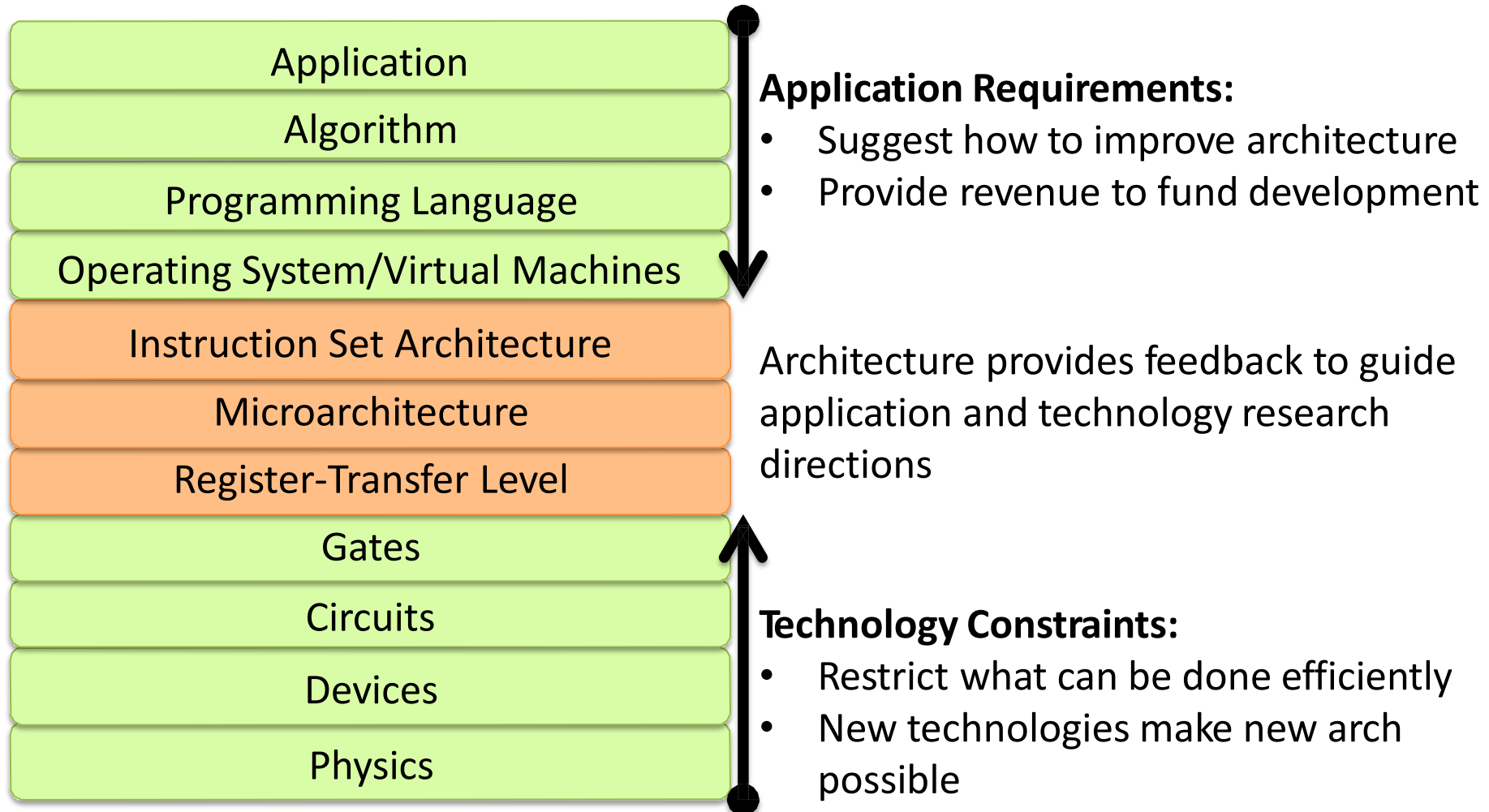
- What is Computer Architecture?

- Evolution of Computing Devices

- Moore's Law

- Architecture vs Organization

Computer Architecture
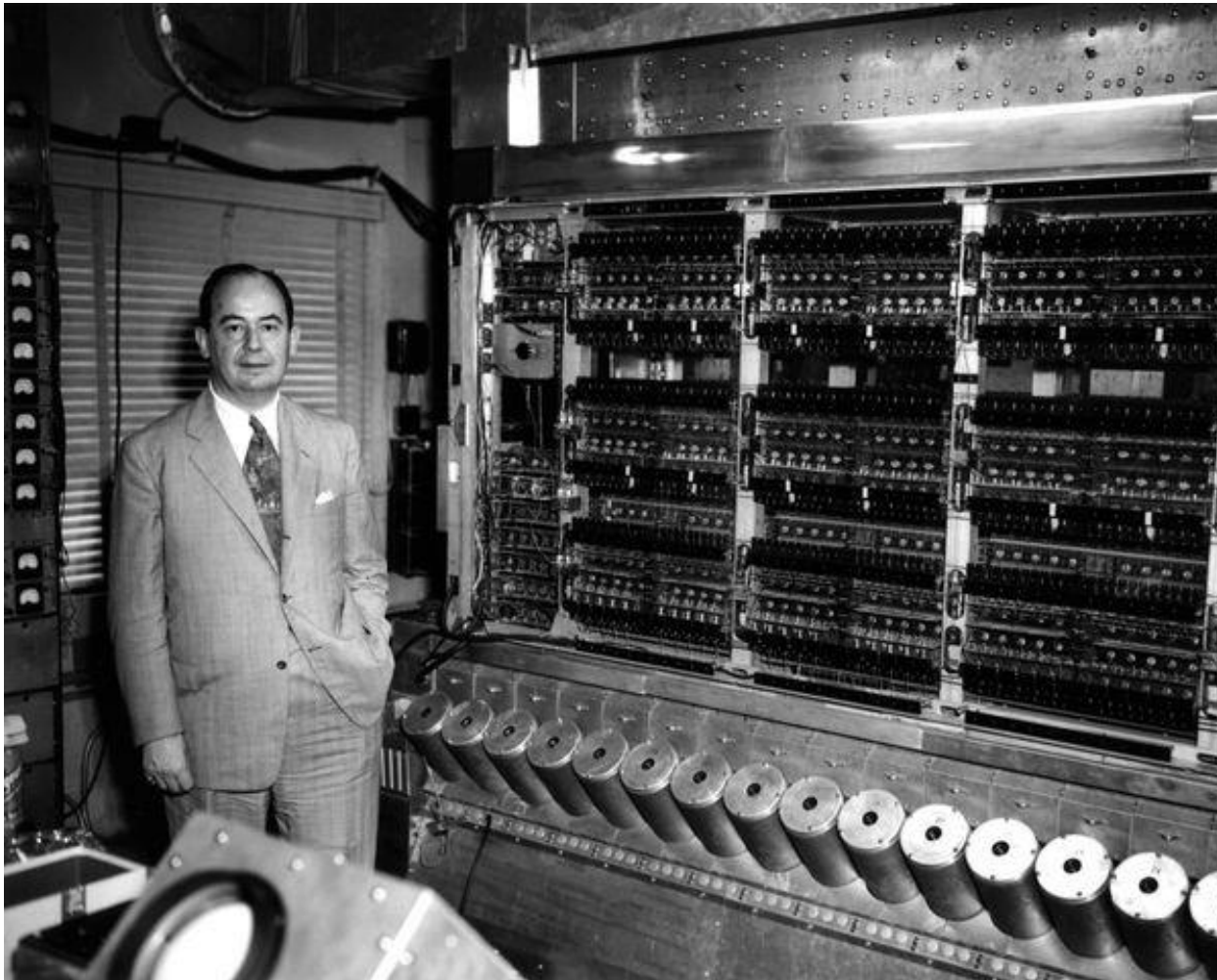
Application

Application Requirements:
- Suggest how to improve architecture
- Provide revenue to fund development

Technology Constraints:
- Restrict what can be done efficiently
- New technologies make new arch possible

Abstractions in Modern Computing Systems

| Application |
| Algorithm |
| Programming Language |
| Operating System/Virtual Machines |
| Instruction Set Architecture |
| Microarchitecture |
| Register-Transfer Level |
| Gates |
| Circuits |
| Devices |
| Physics |

Application Requirements:
- Suggest how to improve architecture
- Provide revenue to fund development

Architecture provides feedback to guide application and technology research directions

Technology Constraints:
- Restrict what can be done efficiently
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Computers Then..

John von Neumann with the IAS Computer (Courtesy of the Shelby White and Leon Levy Archives Center, Institute for Advanced Study (IAS))

Computers Now

Evolution of Computing Devices

Moore's Law

VISUALIZING PROGRESS

If transistors were people

If the transistors in a microprocessor were represented by people, the following timeline gives an idea of the pace of Moore's Law.

2,300	**134,000**	**32 Million**	**1.3 Billion**
Average music hall capacity	Large stadium capacity	Population of Tokyo	Population of China

1970	1980	1990	2000	2011
Intel 4004	Intel 286		Pentium III	Core i7 Extreme Edition

Now imagine that those 1.3 billion people could fit onstage in the original music hall. That's the scale of Moore's Law.

Courtesy:

http://www.intel.com/content/www/us/en/silicon-innovations/moores-law-technology.html