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Speculating
Dependable Computing in 2031



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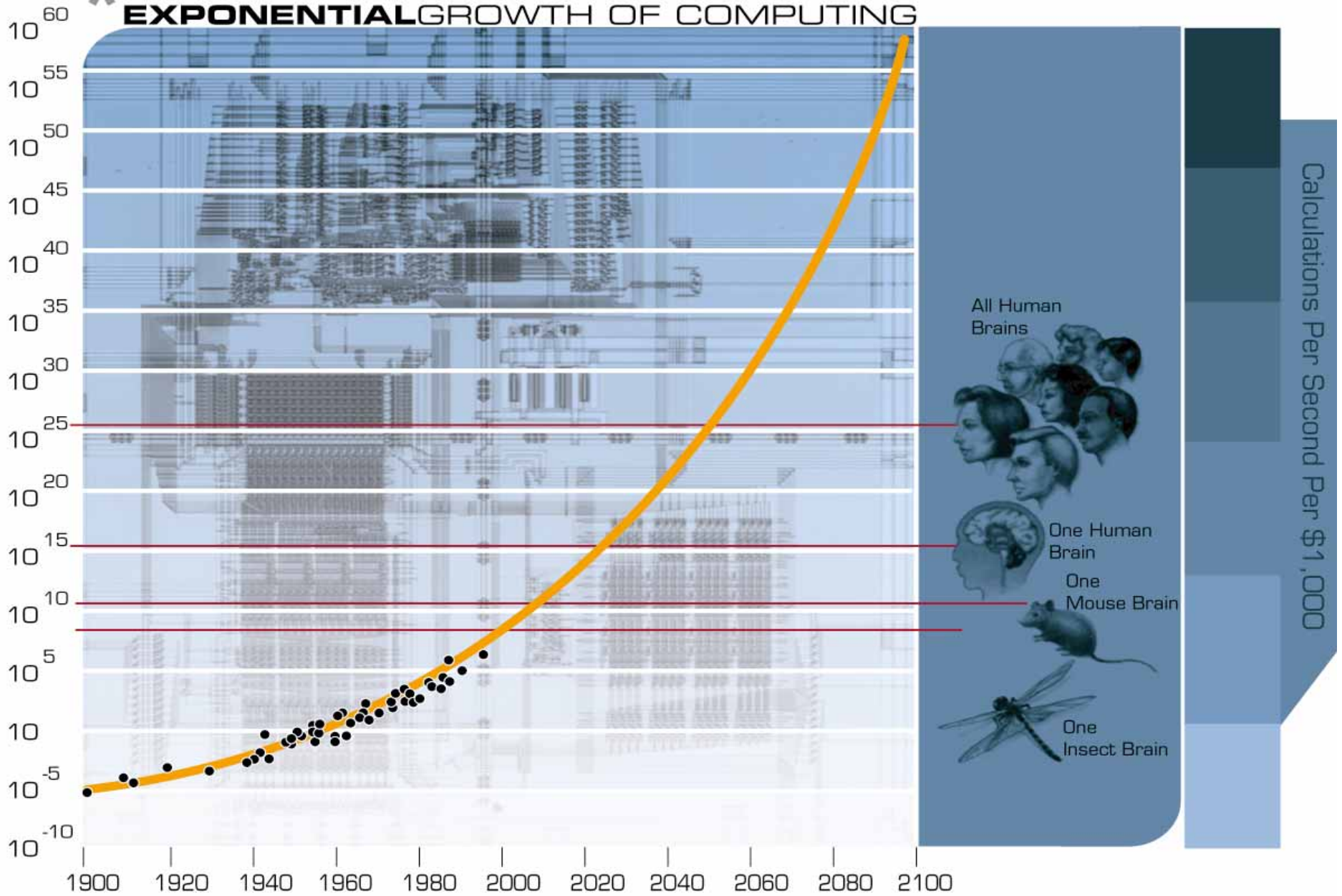


Observations

- Computing power grows exponentially
- Amount of information grows exponentially
- Moore's law still continues
- Human IQ remains flat



EXPONENTIAL GROWTH OF COMPUTING



EXPONENTIAL SCALE

Originally from Hans Moravec "Robot: Mere Machine to Transcendent Mind"



What will be going

- Computing will be free
 - In 2031, computing power will reach 1 Exa Ops/sec/\$1000
 - In 2050, calculations per second per \$1000 will reach 10^{25} , equivalent to all human brains in the world
- Amount of information will be huge
 - In 2031, 10 Zetta(10^{21}) Bytes of new information will be created each year, which is equivalent to all the print collections contained in 1 billion new Libraries of Congress
 - Production of storage media will reach that level, i.e. no information will have to be thrown out
- “Beyond CMOS” will be still CMOS
 - DRAM 1/2 pitch will be approaching to the diameter of DNA, I.e. 2nm



What will have been done

- Ultra-low-power Google and Hyper Google will have been available
- All the information created by a human will have been (or, able to be) recorded and summarized for national security
- DOPS (Dependable Operations Per Second) will have been widely accepted as a simple (single) measure of dependable systems
- DSN will have accommodated a regular session for the Top 500 systems in DOPS of the year



What will be yet to be done

- Dependable design for interaction and integration
 - heterogeneous, complex, uncertain VLSI, software and human
- Dependability of data mining
 - can you trust in the way and result of organizing, summarizing and prioritizing information ?
- Conflict of criteria on “right” information
 - right Information for one human or society may be wrong for the other
- Controlling parameter variability in VLSI
 - variability of V_{th} , performance, power > 100% decreasing reliability and yield significantly



DSN2031 Advance Program

Dependable Society and Nature based on computing systems and networks

This advance program is subject to change depending on technology and society needs

DSN (Dependable Society and Nature) was formerly recognized as “Dependable Systems and Networks”

- Track 1: Dependability of data mining
- Track 2: Design for interaction
- Track 3: Conflict of criteria
- Track 4: Variability of nm-VLSI
- Special session: TOP 500 in DOPS
- Panel : Which computer in the 1 exa/\$1000 class is most dependable in deciding 2034 World Cup winner?