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Relationship Between IT Technology And The User Needs

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Abstract. Nearly all solutions in the current Information Technology (IT) are technology-dependent. And suitable technology—as a rule—is developed to fulfils the specific needs of the user. The paper describes sequence of repeated cycles we can see in the IT development process. A short case study based on SBC (Single Board Computers) technology is included.

Foreword

Nearly all solutions in the current Information Technology (IT) are technology-dependent. But suitable technology—as a rule—is developed to fulfills the specific needs of the user. This correlation is very important not only from the user's point of view, but also from the point of view of the IT solutions developer and producer. Development process creates a specific relationships, as shown in Fig. 1 [2].

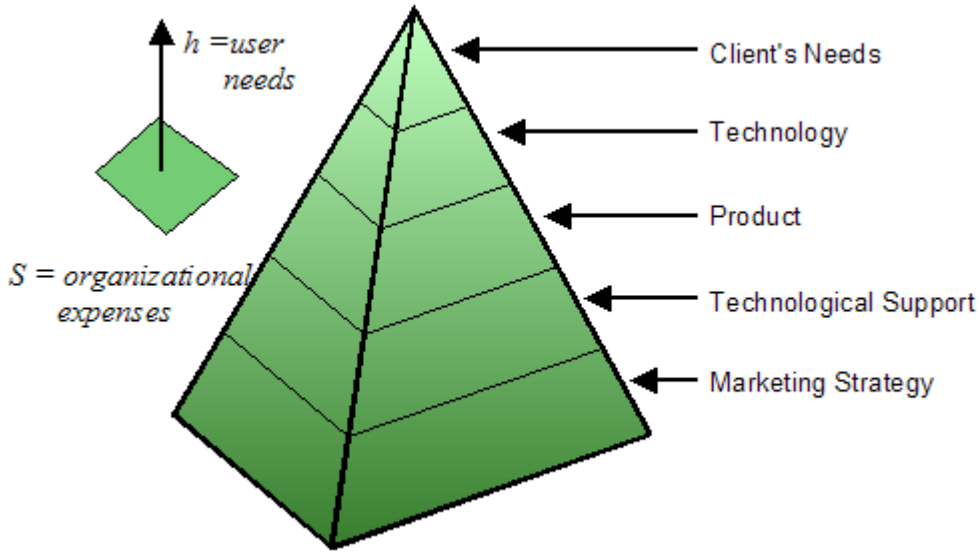

Fig. 1. The pyramid diagram illustrates relationship between user needs in the specific products and services, and the company's expenses, necessary to fulfill the needs [9].

In the paper a short case study based on SBC (Single Board Computers) as a main design components in the distributed data processing widely used in the modern system solutions is presented.

Short History of IT Development

According to John A. N. Lee, Editor-in-Chief IEEE Annals of the History of Computing, history consists of three elements—the event, the activities which lead up to the event, and the impact of the event. Proper analysis of these parts give us an information not only on relationships in the past, but also prediction for the future [18].

For the purpose of this paper, the people history can be divided into two periods:

the pre-computer era
the IT era

The IT era has started when the first computer was developed. Because every computer has two main components—the hardware and the software—the first development we can take into account is the Analytical Engine—the common project of the Charles Babbage and the Augusta countess Lovelace, with the software dated 1835. From this time until now very close relationship between user needs and technology possibilities can be observed [11, 13, 15, 16, 19].

In the 1959 Robert Noyce has developed the first integrated circuit. And in 1965 Gordon Moore has formulated so named Moore's Law of Technology, which specified, that the number of transistors on a chip (means computational power of them) roughly doubles every 18 to 24 months. Based on their personal experience, two developers made proper decision and founded the Intel Corporation in 1965 [3, 10, 14, 17].

Development Factors Relationships

The relationship between IT technology and the users' needs depends on the following sequence [4, 6, 7]:

users articulate the problem (need to fulfill)
new technology is developed
based on the new technology a new product is created.

This sequence is a part of a cyclic development [16] and can be presented in the flowchart form (Fig. 2). The fragment shown represents any particular case.

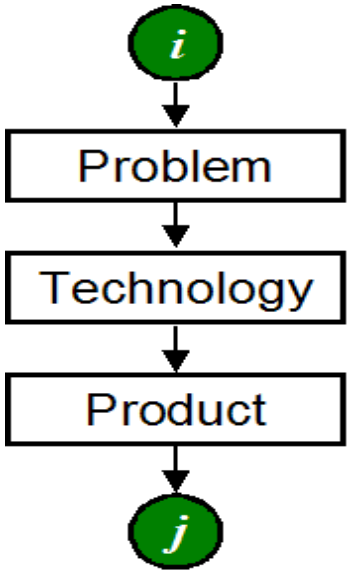

Fig. 2. The product development cycle flowchart [author's design].

So as we can see the new product can be created only when a suitable technology, necessary for production process, exists. And, as a rule, the technology is developed in the response to the need was articulated [1, 20].

Case Study—Blade Servers

We are experiencing storm of innovation, in not just one, but in many of the fundamental technologies of our day. Mentioned storm of innovation is a result of the Moore's Law of Technology (see earlier chapter). And one of the last products of rapidly growing technology is a Blade Servers idea—a contemporary implementation of good known old concept of SBC (Single Board Computer) from the beginning of microcomputers era. In the seventies of last century, the Intel Corporation has introduced the new approach to the system development for distributed data processing, based on idea of SBC—the "supercomponent" with programmable I/O [3, 12]—see Fig. 3.

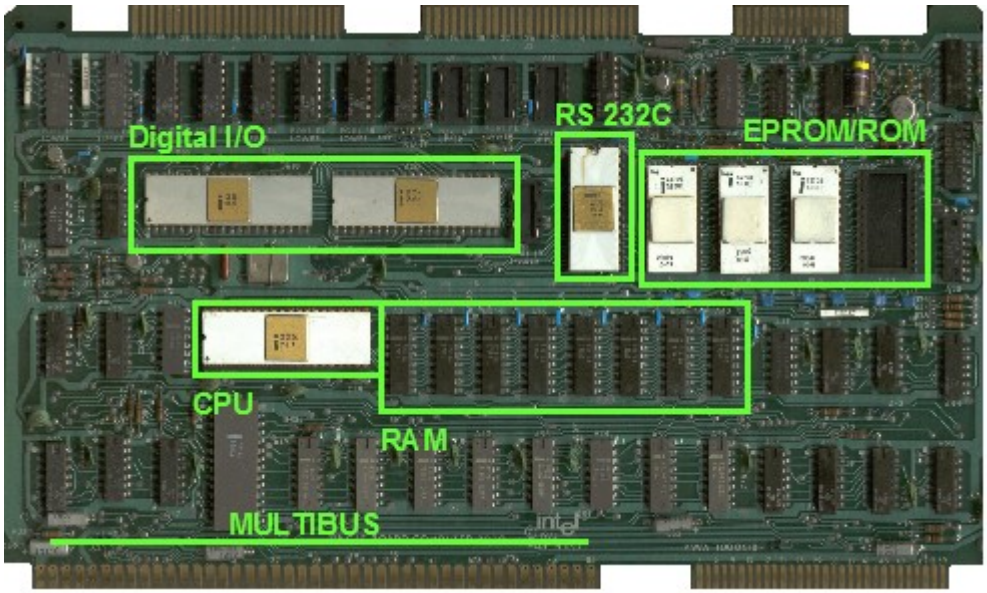

Fig. 3. The SBC 80/10 computer—predecessor of the Blade Server [3].

Technical and functional possibilities of this component were quite limited (see Table 1), but the idea was brilliant.

Table 1 . Parameters of the first SBC [3]

Processor	Single 8-bit 8 MHz microprocessor
Memory	1 KB RAM and sockets for 8 KB EPROM or ROM
I/O Lines	48 digital I/O lines and RS-232C serial interface
Form Factor	6,75" x 12"
Comments	1. No network (only cassette MULTIBUS interface) 2. No disks (only small data-acquisition applications)

Rapidly technology development, based on properly defined user's needs, results in the contemporary equivalent of the SBCs—the Blade Servers—example of design is shown in Fig. 4 [8, 20].

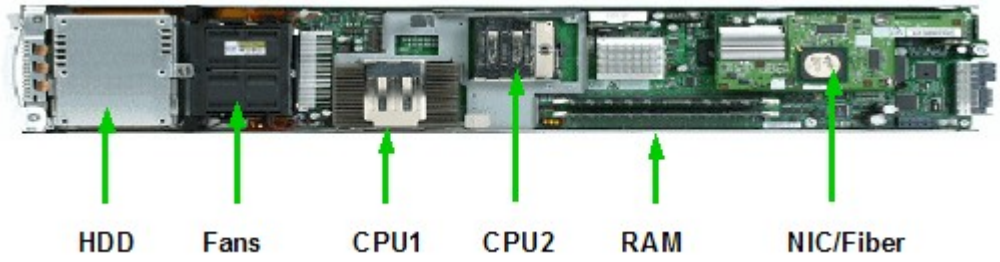

Fig. 4. Main parts of the Blade Server from HP BL line [8]

Also technical and functional possibilities are spectacular (see Table 2).

Table 2 . Contemporary Blade Server Specification [5, 8]

Processors	Two 32-bit 3,6 GHz processors
Memory	Up to 8 GB ECC DDR RAM
Storage	Up to 2 internal SCSI or (S)ATA HDDs
Network	Up to 4 1-Gb network ports
Form Factor	1U x 3U or 1U x 6U
Comments	1. Sophisticated fiber-optic connections 2. Build-in RAID controllers for both internal/external drivers

Because of mentioned technology development it is possible to create flexible data processing centers with high density of computational power, as we can see in Fig. 5.

The picture shows a server array created in a single 19-in rack, which consists of one hundred and sixty processors. All computers in this case use fiber-optic links for the network connection [5].

Conclusion

Today computers are very fast and reliable devices, with a huge computational power. All of them used a lot of technology developments created during past years. And every time the current product line depends on and represents the levels of the contemporary technologies. So the user needs can be fulfilled only when exists the suitable technology.

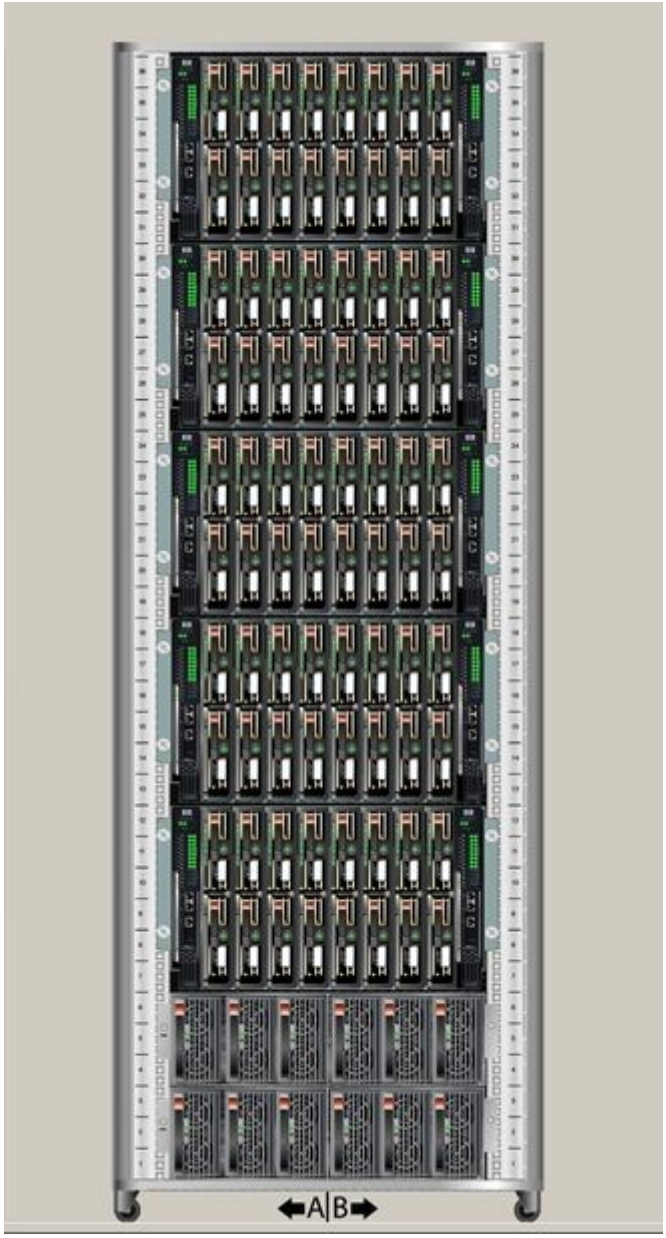

Fig. 5. Example of high-density Blade Server solution [5]

References

1. Celebrating 20 Years of Innovation, CD version, Compaq Information Technologies Group, L. P., 2002.
2. Damgaard J.: *IT On the Fast Track,* Optimize Magazine, September 2002.
3. Garrow B., Johnson J., Maerz M.: *The 'Super component': the one-board computer with programmable I/O,* article in "Applying Microprocessors"—Electronics Magazine Book Series (editors: Altman L., Scrupski S.E.), McGraw—Hill Publications Co., New York, 1976.
4. *HP-35 handheld scientific calculator—1972,* HP Virtual Museum, 2005, `http://www.hp.com/hpinfo/abouthp/histnfacts/museum/chronological/index2.html`
5 *HP Blade System p-Class Infrastructure Simulator,* version 1.0, RedVue Simulation Technologies, 2005.
6. HP Garage, `http://www.hp.com/go/history/hp_garage_and_home_renovate15.pdf` Hewlett-Packard Company, 2005.

7. *HP inwestuje w wielki format,* Computerworld nr **31**, 30 sierpnia 2005, IDG, Warszawa, 2005.
8. *HP ProLiant BL strategy for rapid deployment and reprovisioning of high-density servers technology brief,* Hewlett-Packard Company, 2004.
9. *HP Test & Measurement Catalog 1997,* Hewlett-Packard Company, USA, 1996.
10. *Intel Inside Program Pentium Processor Market Development Kit,* Intel, Jan. 1998.
11. Maxfield Cl. "Max" and Brown A.: *Bebop Bytes Back. An Unconventional Guide to Computers,* CD version, TechBites Interactive Inc. and Doone Publishing, 2005.
12. Michalski A.: *Server Solutions for High Performance Computing,* chapter in the monograph 'Geographical Information Systems in Research and Practice, GIS Forum and University of Silesia, Zagreb, 2004.
13. *Microsoft Encarta Reference Library 2006,* Microsoft Corporation, 2005.
14. Moore G. E.: *Cramming more components into integrated circuits,* Electronics Magazine, vol. **38**, No 8, April 19, 1965.
15. *Multimedialna Encyklopedia Powszechna WIEM 2006,* Onet.pl S.A., 2005.
16. Orilla L. S.: *Computers and Information. An Introduction,* Third Edition, McGraw-Hill, 1986.
17. *PC Plus past-present-future. The PC Plus Decade,* PC Plus Magazine No **120**, UK, October 1996.
18. Pearson J. P. (Ed.): *Digital at Work. Snapshots from the first thirty-five years,* Digital Press, 1992.
19. Sanders D. H.: *Computers Today,* Second Edition, McGraw-Hill, 1985.
20. *The Innovation Timeline. Highlights of Compaq's History,* "inline" web page (`http://inline.compaq.com/hr/eecomm/timeline/`), Compaq Computer Corporation, 2002; (`http://hpnow.corp.hp.com/hpinformation/history/compaqhistory/index.htm`), Hewlett-Packard Company, 2005.