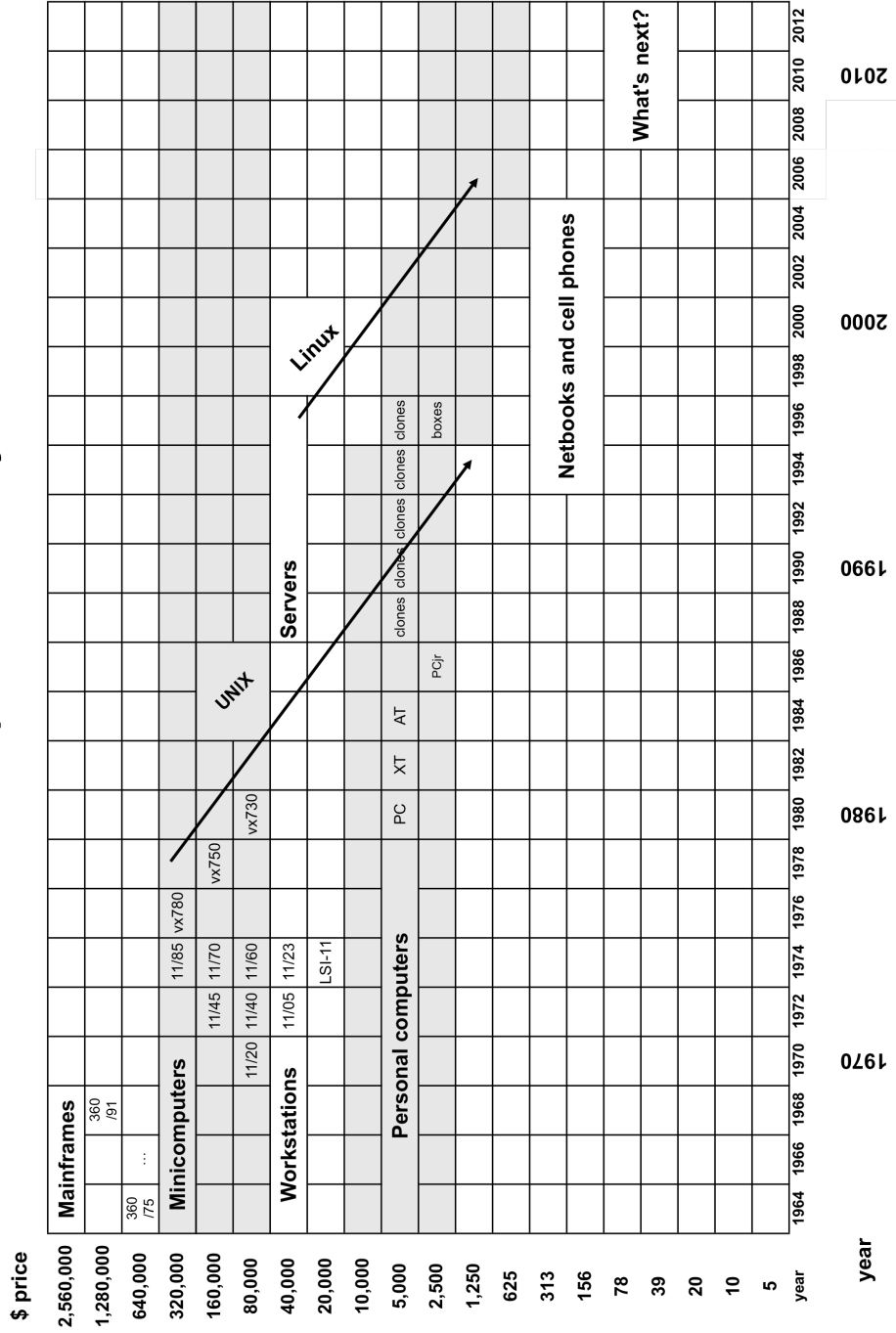


Moore's Law

Trends in computers driven by Moore's Law



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Moore's Law tells us that the computing power of a computer doubles every 1.5 to 2 years.

Each vertical column represents a two-year period. Each horizontal line represents a price class of a computer or digital device. The vertical scale is logarithmic, which means that the price doubles each time you go up a line.

According to Moore's Law, every 2 years the computing power that is represented by a computer in a given box of this chart moves to the box down and to the right of the original box.

For example, the 11/45 computer shown in the box for \$160,000 in 1972 could be replaced in 1974 for \$80,000 by the 11/60 computer without giving up any computing power.

Similarly, the 11/45 computer in 1972 could be replaced by a similarly-priced 11/70 in 1974 and the buyer would have a system with double the computing power.

Therefore we say that constant computing power runs down the diagonal lines to the right, becoming ever more economical. I believe it is also correct to say that software, such as operating systems, and application software, such as payroll programs and word processing programs, follow the computing power down the diagonals.

Interesting things happen when software that was running on a \$160,000 computer (an 11/70) system in 1974 can be run on a \$5,000 computer (a PC-AT) in 1984. Suddenly, the users of such software can become individuals and small businesses, rather than large corporate entities. Such shifts cause the center of market growth – and excitement in the venture capital community – to move down to the emerging applications in the lower-cost computer markets. This was true when minicomputers became the center of high-growth around 1960 and after; and when personal computers became the center of high growth around 1980 and after. The same transition seems to have occurred in the transition to portable and pocket devices (PDAs and other personal digital devices) around 2000.

There is another important lesson in the history of these transitions. When Apple introduced the Apple][computer in 1977, the initial buyers were hobbyists. But when the first spreadsheet application (Visicalc) came along, the Apple][became a business computer, enabling usages that were not foreseen by the manufacturer of the hardware. Likewise, when Apple introduced the Macintosh in 1984, the initial buyers were individuals doing traditional applications. But when the first page-layout program (Adobe PageMaker) was

introduced along with the laser printer, a new phase of growth emerged with the application in the professional graphics and editorial markets. Again, the particular application was not foreseen by the hardware manufacturer.

This makes us ask ourselves, "What are the applications that will enable fast growth in unforeseen areas." Often, it is best simply to build the hardware and wait for the application developers to come along. But you can also encourage development by providing support and encouragement to the developer community. And you can also seek out partners and inventors who have ideas that apply to the hardware you have built.

We are in the midst of the transition to portable, personal devices as the high-growth area for "computers." We are also seeing digital devices define consumer electronics in the home in unprecedented ways. But that is another story we will come to later.

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Get Out of the Way!
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