The Macintosh Computer – Archetypal Capitalist Machine?
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Preamble: This essay was written in 1987 before the domination of Microsoft, at a time when I thought that the people running Apple computer had their act together. How wrong can you be! In other respects however, many of the ideas and concepts advanced in this essay have come to pass in a most fundamental way.

The Macintosh

The Macintosh computer represents a fundamentally new approach to the way machines interact with people. The philosophy inherent in the Macintosh is, for the vast bulk of working people an augur of the direction that contemporary capitalism would like to see production relations take. At the same time the Macintosh also expresses many of the contradictions of capitalist relations, and so for this and other reasons the philosophy inherent in the Macintosh makes it an ideal example for study if we want to understand how science and technology are being used to wrest more and more surplus value from labor, whilst at the same time reducing the amount of control workers have over their own lives.

But what makes the Macintosh so different from other kinds of personal computer? Aside from the raw power of its main processor (equivalent to a room-sized machine of say 15 years ago), the operating system represents a radical departure from the essentially "science" based systems of such machines as the Apple][or large mainframes. By this I mean that in order to interact with earlier forms of the computer, some considerable knowledge of the computer itself is necessary in the form of a computer "language" that the user must first master before being able to make use of the machine's computing power.

In this sense virtually all computers prior to such machines as the Macintosh represent the formative stages of the development of computer technology as it is expressed under capitalism.

The Rise of the Machine

There are many useful analogies available to us from the first era of machine development during the Industrial Revolution that can help give us a better understanding of what the Macintosh represents. During that period the development of industrial tools followed a somewhat similar path insofar as the kinds of techniques embedded in the machines were discrete reflections of specific human skills. In other words, the first machines were not "general tools" in the sense for example, that the modern numerically-controlled machine tool is.

What do we mean by a "general tool"? The process of transferring "skills" from human to machine is essentially done in stages. The first stage involves a craftsperson building a prototype machine which consists of the craftperson's brain/hand skill being broken down into its component parts and each process being assigned to a specific element of the machine. A good example of this process would be the metal turning lathe. The lathe itself consists of several elements. The first is motive power (this emulates muscle power), the second is measurement (which embodies generational experience of the physical environment), the third is the process of transforming the raw material into a useful product (this represents the actual tool using capability of the craftsperson).

In the development of the lathe the process of synthesizing these elements may take place as follows: Power in the form of rotational motion must first be transferred to the chuck (the chuck represents a discrete, artificial form of hand for holding the work in place); a method of transferring measurements to the material to be worked on, and finally the cutting tool itself and its interaction with the material to be transformed. In the initial development of the lathe the cutting tool had to be brought in contact with the raw material manually and the measurements for how much metal to remove were also done manually (with calipers and later micrometers). But as more and more expertise became embedded in the lathe, the operator could simply set vernier dials on the machine and eventually even the act of cutting was automated via a screw-driven feed connected both to the cutting tool and the rotating chuck (it is here that we begin to see the emergence of feedback systems of some complexity, eg. the lathe has to "know" when to stop cutting). The act of developing the lathe then is a two part process, first, the job is broken down into its discrete parts which are then "re-united" via the inter-action of various forms of generalized feedback (as in the above example).

The end-product of this process is the emergence of what I refer to as a "general tool," that is, a tool whose basic principles embody not only the specific skills of the craftsperson, but more importantly, the "skills" are embedded in the lathe in such a way as to "mask" not only the craft origins of the process in terms of the skills needed by the operator to use the machine, but more importantly, the tasks are standardized via specific elements incorporated into the operating system of the lathe.

This is done by "pre-setting" the lathe as much as possible for a single task or series of tasks. In this way the operator need only know, firstly, how to load the lathe with the raw material, then how to turn it on, and finally, how to start and stop the sequence of operations that results in the end-product, the finished article.

The account above is an accurate if abbreviated description of the nature of the technical transformation brought about by the advent of the industrial system. That machine tools are now many orders of magnitude beyond the originals in complexity and versatility does not alter the fundamental concepts that they all utilize. Indeed, until the advent of the computer, basic machine tool design has not fundamentally changed since the 19th century, and even with the addition of computer control, such tools still use the same basic principles.

Microchip Meets Machine Tool

The process started by the industrial revolution has reached a pinnacle in the form of the computer, for the computer is essentially the "end-product" of industrialism in the sense that it acts as a unifier of discrete, industrial processes in the same way as the lathe did for craft processes. At this point we could ask a hypothetical question about the nature of the "end-product" of computer development; what form would a computer take, if it too, were to go through the same process of rationalization as the machine tool has? By this I mean is there an equivalent computer version of the "general tool" for people with a "generalized" education? The implications of such developments are, in my opinion as revolutionary as the development of the machine tool was.

The slogan "the computer for the rest of us" is extremely misleading (and probably has a lot to do with why Apple dropped it), but buried in the idea is a kernel of truth, for indeed if, and it's a big if, some kind of standard for using computers were to be adopted by all computer makers, then the promise in the slogan could have read, "The Macintosh, universal tool, the computer for all of us." There are heavy ironies on many levels, which are not only interesting to pursue simply as ideas, but also relevant to the direction society is, or could be taking.

The market economy as it is now constituted presents many obstacles to the adoption of a general tool such as I have described above. A corporation like IBM of course has the clout to try and force its standard on everyone else, but in fact it is more likely to be the State in the form of the IRS or some other large bureaucracy that decides what the standard should be (simply by virtue of sheer numbers bought and the need for a common protocol of communication).

In a sense the Macintosh operating system is a form of "State Socialism" in that its effective operation depends on absolute adherence to what are euphemistically known as "the Macintosh guidelines." The user interacts with the operating system via a command structure that is the same regardless of the application. Now while I have no fundamental quarrel with this approach, for it to work effectively everything must be "in" there, that is to say, every possible contingency must be planned for.

This after all is what the Toolbox is all about (note the description of the sub-routines or "mini-programs" as Tools). It parallels very closely the kinds of standards developed in machine tools, for as with the industrial tool, the operating system effectively "masks" the "real" operation of the computer by interposing itself between the user and the Central Processing Unit. The operating system then is itself the "general tool" that I referred to earlier. This approach has other drawbacks for it means that all applications written for the machine must conform to the rules or "guidelines." Apple even suggest that the application be sent to them for "clearance." What this means is that they check it to see that it doesn't "collide" with some other application that may be co-resident with it, or parts of the operating system itself (which in turn may have already been "harmonized" for some other application already loaded into the machine). This further suggests that one fundamental error was made in the design of the operating system, namely that it is not a true multi-tasking machine, for a multi-tasking machine is inherently designed to accommodate different applications concurrently.

Even this modest scratching of the surface of the Macintosh reveals the incredible complexity of such a general tool, not so much because it has so many disparate functions but because they can be combined in a never-ending array of permutations. It also illustrates just how much expertize and labor is actually embedded in the machine's operating system.

A Further Look at the "User Interface"

If one looks at the commands and functions built into the Macintosh, we see that the majority of them emulate basic communications functions like drawing, positioning and pointing at objects (the so-called Quick-Draw and associated routines), as well as font manipulation. In the background of course, the operating system is active continuously, monitoring the keyboard, disk drive and so on.

The Macintosh then is a multi-purpose graphics-based computer that has a built in set of "tools" for manipulating the Central Processing Unit (as well as the auxiliary processors) which interacts with the user through a set of choices represented by words or images. The icons are simply generalized signs for objects or functions (the use of language independent images for universal communication is well known to us through, for example, international traffic signs). For example, the "undo typing" command in Macwrite doesn't know what typing it's undoing, it just does it, the command itself is a "generic" term, which in turn acts on certain "assumptions" made about the command.

But with all the talk of icons on the Macintosh, it is the Word that has become the real icon, in that by generalizing English words, the operating system has been "colloquialized", or opened up to the speech of everyday interaction. In other words, "any fool can use it". And it is a fact that the Macintosh really is easy to use (as well as being extremely frustrating at times), anybody can master the basic system in a very short time.

The Dictatorship of the Machine

One of the chief objections to such machines as the Macintosh is the fact that it is essentially a "black box." By this I mean that the inner workings of the machine are "sealed off" from external access by the user interface. The "shell" erected around the operating system (the menus and commands), although extremely comprehensive and easy to use, deny access beyond a certain "depth." By contrast machines such as the Apple][allow penetration by any user to the basic binary system of operation that the central processor uses. Not only that, a computer such as the Apple][is physically open to anyone, with direct access to the main processor, enabling anyone with sufficient knowledge to "tinker" with the workings of the machine itself.

By contrast many people have raised serious objections to the "black box" approach used by machines such as the Macintosh, arguing that by making the machine into a closed system it not only reduces the range of choices open to the user, but perhaps more importantly it encourages a particular attitude towards machines in general by mystifying the processes involved, which in turn leads to a state of unquestioning acceptance of the supremacy of technology. This is of course a process that began with the industrial revolution.

A comparison between products of the first industrial revolution and the revolution we are in the middle of illustrates the difference. The first products of the machine age were essentially simplified versions of the craft original (simplified because the machines themselves still reflected on the one hand their craft origins, and on the other because they were still relatively crude machines their powers of "resolution" were limited). What this meant was that the products of the early machines were still accessible to the craft worker, they could be repaired or modified by hand, but perhaps more important than that, the processes embedded in the products were comprehensible to the worker. Inevitably as the techniques used in production got more and more complex and the sophistication of the machines grew, so too the products became more and more inaccessible to the ordinary individual. In this sense then, the Macintosh reflects the general trend of industrial production to further alienate workers from the processes they are involved in.

There are obviously a variety of forces at work that result in this development which reflect on the one hand, the nature of productive relations (increasing complexity), and on the other, the drive to increase profits (which in turn has an important effect on such things as complexity, repair versus replacement). It obviously benefits the manufacturer to replace rather than repair a product (the tag, "no user serviceable parts inside" is by now, well known to us). The issue is however more complex and reflects a much larger problem, that of the relationship between consumer and producer, which in turn is predicated on the level of education.

Elsewhere in this essay I mentioned "general education" as a reflection of the generalizing effect of industrial production on the labor process. The specialisation necessary for modern science-based production methods is predicated on the existence of a strata of the workforce who possess unique knowledge of the processes involved. This technocratic "caste" is indispensable to modern productive forces, but even this highly trained segment of the workforce is under threat from developments in the field of so-called "expert systems and Artificial Intelligence."

"Hoisted by Its Own Petard!"

Driven by the necessity of maximizing profits, yet hounded by the inherent contradictions of ever more efficient production processes, capitalism has sought to resolve the conflict by, on the one hand eliminating human labor as much as possible from the process of production, and on the other, by binding it as closely as possible to the organization and nature of production. This has been achieved through a series of scientific, technical and political revolutions. But ever more efficient production eventually lowers profits, this is the irony of industrial capitalism. Once you have maximized the efficiency of production there is no place else to go! If wages have been

held to their lowest, and you are using the most efficient machines (more efficient than any of your competitors) you will eventually find that production exceeds consumption.

Each round of technical advances has heightened the contradiction, by making production cheaper and cheaper, which means that in order to make a profit, you have to squeeze more out of the consumer, who is also a producer (or at least some of them!). The time lag between the introduction of a new technology and its eventual absorbion by society grows ever shorter. Hence technical change is forced on us with greater frequency. Eventually however, it must "bottom out", there is a finite limit to the amount of production the world economy can absorb, at least as it is presently set up.

Revolutions in Production

Each revolution of production under capitalism has been based on the introduction of a new, key invention or process. Depending on where in history you want to start from (I like to "start" from the Renaissance, or about 500 years ago), the "progress" of the development of machine technology can be traced by the advent of each new technology and its effect on society. In the 19th century, first the canal, then the railway. In the 20th century, first the internal combustion engine, followed by the airplane, and finally computers, have in turn formed the basis for a revolution in production.

For example, the chronograph can be seen as a key invention, which in turn stimulated and/or created the right conditions for other, connected kinds of inventions and processes. But accurate timekeeping was the result of the necessity to bind together an empire, for without it accurate navigation and hence mapping was impossible. Greenwich Mean Time is one obvious "general tool" to emerge as a result of that event, or "general time"; a fixed standard whereby no matter where you were in your empire, you knew how quickly you could move your resources from one location to another. The "spinoff" from the chronograph was amongst other things, an increase in the accuracy of measuring tools. This was prompted by the need for precisely made cogs and other moving parts. This in turn meant that the tools needed to turn out such devices had to be more accurate, which in turn prompted more accurate devices for making tools...

Homogenization of Knowledge

As with the invention of "general" time, which was the culmination of a long historical process, each wave of innovation has eventually arrived at the point whereby general principles and standards have been extracted. Standardized units of measurement (the decimal system, electric voltages, screw thread dimensions etc) are the end product of many millennia of observation and practice.

Taylorism for example, does for the actual integration of the production process, what standard units of measurement does for the machine tool itself. The invention of the telephone initiated the process of the standardization of communications protocols. Ultimately then, it would follow that the introduction of computers into production and distribution would eventually arrive at the same destination, that of standardization and the extraction of general principles of use. General principles would be laid down about, for example, the way computers relate to production processes. We already see such things in the field of electronic communications, but the process is of course, fragmented and uneven in its development and application.

The General Tool

What they all hold in common though, is that each process is eventually so thoroughly assimilated by society, as to become a part of the "general knowledge" of society (much in the same way as everyone knowing how to drive a car).

It is interesting to note that Apple has, so far successfully, squashed all attempts to imitate its user interface (the so-called desktop, pulldown menus etc), threatening to sue any company that comes close to imitating the "look and feel" of the Macintosh environment. It is tempting to speculate about what kind of long term view Apple have of the development of the computer/human environment (for good or bad). It would appear that Apple have recognized the necessity for a "universal" means of accessing the computer. If, in one form or another, a set, standardized way of accessing computers can be established that enables the "de-skilled" and "unskilled" to access computers and the dead labor they contain, the complex problem of maintaining society can be handled without resort to educating everyone to the level of the university.

But for this to happen, for a critical period of time, one system must dominate! This is obviously what Apple are banking on happening. AT&T has done it in telecommunications. IBM has already done it in the "business" environment, but that is the land of the Nabobs, we are talking about the domain of Burger King! As office automation accelerates, and virtually all forms of commercial interactions are "standardized," the problem of utilizing a deliberately under-educated workforce to handle extremely complex tasks, becomes a "manageable" one. The standardized interface of the Macintosh lends itself well to

dissolving the difference between “factory” and “office” work. The old, artificial hierarchy of blue and white collar work is on its way out, to be replaced by the generic, general service worker, who has enough skills to work a slick automated terminal like the Macintosh, and dispose of the output in some way (ie., post it, stuff it or shred it), but a person who has no control over the work being done! For proof of this we need look no further than the cash register of a typical fast food chain. The only numbers you see are the final bill! All the cashier need do is punch a button marked “cheeseburger,” or “coke,” the built in processor handles all the addition and taxes.

The Macintosh that I sit writing this on, runs in a similar way to the fast food cash register, in that, in order for example, to change the font that I am using, all I need do is move the cursor to the “button” marked font, and select one! The old way would mean knowing a set of commands that would load a different font into memory, and then only when the document was printed. They might be, “ESC E-56, ESC-CTRL L”, and further, they would have to be inserted in the text at precisely the right point and then turned off at the appropriate point by another yet another set of commands.

User Friendly?

If the technical/professional elite are to maintain the system, they must make it as simple as possible to operate. By embedding the maximum number of possible states inside the code of the machine, it is possible to account for most of the situations likely to be encountered. In effect, all you need is the ability to read and follow instructions. As we saw above, no knowledge of a complex command language is necessary to make the computer do different things, the computer itself already contains all the necessary linked sets of instructions. If it goes wrong, or you do something wrong, monitors will spot it and a supervisor will be dispatched, no big deal. Each cog in the complex machine holds no indispensable power or leverage. Notice how the “toolbox” that the Macintosh contains, parallels the synthesis of general sets of knowledge that may be accessed and comprehended by all! What we are seeing then, is an exact duplication of the first industrial revolution where craft skills were stolen and locked into the industrial machine, then perfected to the point whereby general principles could be extracted and applied to ever more sophisticated machines, each in turn, requiring less and less skill (and labor) to operate!

The languages that computers use reflect this process, for the first languages were specialized tools of mathematics and logic (again reflecting the “craft” origins of computers), but arcane and abstruse, understood only by the select “few.” Further, the very nature of the specialized origins of computers has led to a mystification of the processes, leading to the common misapprehension that computers are complicated, “devilish” devices that only “hackers” and “eggheads” can comprehend. The Macintosh breaks with that tradition, at least in one sense. It is also, paradoxically, a logical extension of the same process! But it is the general nature of the principles embodied in computers, that makes them be, “all things to all people.” It is this apparently contradictory nature of the computer that makes it so difficult to deal with. The computer is inherently a two-edged sword, unlike the factory, yet very much a part of it. Uncannily “human”, it is nevertheless seen as the ultimate in “inhumanity”.

Conclusion

The Macintosh is very much a creature of two worlds. On the one hand it represents the highest level of collective labor currently possible. By this I mean that only the most integrated form of collective work could have produced such a device, utilizing virtually every discipline available to us. The “toolbox” routines represent the distillation of literally thousands of years of collective experience.

On the other hand, the computer is also an archetypal device, like the assembly line, except that it is diffused throughout the fabric of society. It is the precursor of the “general-general” tool, a tool which will either enslave us or take an active part in our liberation. For the end product actually is the synthesis of the living, collective labor process that created it, this is one of the reasons why the conflicts raised by its existence are so intense. This is also precisely the reason why it makes such an interesting object of investigation. The key originators of the Macintosh interface, Alan Kay and R. Buckminster Fuller had a very clear picture of what they wanted it do, and how it should do it. Called the Dynabook, it was to be a paperback sized version of the Macintosh, battery powered with a complete “toolbox” contained within it, all designed to be the literal extensions of the literate people who would use it. They saw the Dynabook as a universal tool, enabling people to communicate with each other using the collective skills embedded in the ROM chips. Add to this, the access afforded to databases of collective knowledge and you have not so much a technology but a philosophy of technology. You might call such a vision “idealist”, on the other hand the alternatives are far worse. For capital sees such tools as a means of extracting more and more surplus value from our labor. The very people who make the corporate decisions about the direction society should take, are also the same people who would delegate the role of starting nuclear war to computers! They care very little about the impact of computers and automation on life. They would entomb ALL living labor in machines had they the power!

In very many ways, the computer, especially in its Macintosh form, also represents the very antithesis of capitalism, for in spite of the fact that it represents the forefront of capitalist innovation, it also represents the very highest level of socialized labor currently possible. Not only that, but in order to extract the maximum advantage from such technology, private ownership actually gets in the way, unless that is, there is to be one computer company, one telecommunications company, and one manufacturing company! All this tells us, is that computers and automation are an inevitable end product of monopoly capitalism, which would remove all competition from our, so-called "free enterprise" system, of which Apple Corp. is so much a part. The universal tool of which the Macintosh is the precursor, has the potential to open up knowledge and hence control to all people, that is why I can regard such a tool as an extension of the intellect, and someone else be enslaved by its simplistic, collective "mind." More's the pity that for most of us, such potentially liberating tools will be used against us, making them objects of fear, and in the process imbuing them with almost mystical abilities as they apparently mimic aspects of human behavior. But like any window, the Macintosh window can be a view from a prison cell or open on to a new world waiting to be explored.

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