In his 1986 study *The Control Revolution: Technological and Economic Origins of the Information Society*, James Beniger notes that there have been more than sixty societal transformations identified that we have apparently lived through between 1950 and 1984. More than half of these transformations have been driven by computers and information technology. The succession of transformations identified have included the computer revolution, the electronics revolution, the information age, the age of the smart machine, and the micro revolution. But Beniger also notes the chronic inability of past generations to appreciate the major societal transformations of their own eras, and argues that this inability extends to this most recent crop. This historical myopia, Beniger notes, is the product of two factors: first, important transformations of society seldom result from single discrete events but evolve through gradual changes, and, second, those living through transformations are frequently distracted by events and trends more dramatic in immediate impact but less lasting in significance. Despite this myopia, there has been no lessening of pronouncements concerning this transformation of society, that entry into a new age, or the dawning of another new era.

The current darling of both the media and the intelligentsia, though now growing a little long in the tooth, is the postmodern age, an age which has
dutifully subsumed the computer age. Computers and postmodernity have been waltzing hand in hand for some time now, perhaps beginning with Lyotard’s conjoining of the two in the opening and closing pages of *The Postmodern Condition*. At least since that time, academics, scifi writers, journalists, and keyboard jockeys have been finding ways to bring to the fore analyses of virtual reality, cyberspace, the Internet, muds, moos, and cyborgs that disclose the cusp on which our postmodern, wired age supposedly rests. There have been numerous special issues and edited collections on the connections between technologically driven cyberpunk science fiction and postmodernism. Writers as diverse as William Gibson, Bruce Sterling, Tom Maddox, Frederic Jameson, Donna Harraway, and Allucquere Rosanne Stone seem equally comfortable commenting on information technology, science fiction, and postmodernism. Magazines such as Mondo 2000 and Wired and journals such as *Science Fiction Studies* regularly feature discussions with AI researchers and figures from the frontlines of both the postmodern age and science fiction. In short, the conjunction of postmodernism and computers has become a mainstay of both academic and popular presses as has the claim that computers are ushering in a new age, that we have made some kind of break or transition into the brave new world of postmodernism and computers.

The issue I wish to address today is to what extent these pronouncements may suffer from the same historical myopia that Beniger documents in those sixty or so other transformations we have seemingly lived through. I believe that we may be better off thinking about the computer and the manner in which it is experienced and represented in society, not in terms of a postmodern age, a period discontinuous with the past, but as continuous with modern culture. Our understanding of the computer culture, our social
and cultural experiences, representations and discourses of and about computers, may be enhanced by placing them in the context of a discussion of modernity not postmodernity. In order to support these claims I will attempt to demonstrate the connections between modernity and the computer culture and then touch on some of the benefits to be had by thinking about computers in these terms.

First, though, a few words of caution. It would take a herculean effort to even begin to make sense of the tangled debate over modernism and postmodernism and I’m seldom given over to herculean efforts, especially in a twenty minute time slot. So please forgive my admittedly naive invocations of modernity and postmodernity. I also wish to draw together a variety of disciplines and writings in thinking about the computer culture. I want to draw on work in artificial intelligence and philosophy, journalistic accounts, the science fiction of writers such as William Gibson, Tom Maddox, Patricia Cadigan, and Marge Piercy, and manifestos, comments, and observations that have appeared on or grown out of observations on the Internet. In the context of a discussion of popular culture this hardly seems unreasonable, indeed it seems necessary. Additionally, it acts as something of a corrective to those accounts of computers and postmodernity that focus primarily, if not exclusively, on the cultural sides of computer discourse while ignoring the science of computing. I remain cognizant of the fact, though, that I will be ranging over distinct disciplinary boundaries and that this can be fraught with hazard.

What I would like to do, then, is make three approaches to the subject of computers and modernity, highlighting three characterizations of modernity: the first in terms of its emphasis on newness and innovation, the
second in light of the twin frameworks of Enlightenment and Romanticism, and the third drawing on its dynamic and dialectical nature.

The first approach begins with a general, widely noted feature of modernism: the pressure to be new, innovative, revolutionary and the resulting emphasis on the transitory. “Modernity,” wrote Baudelaire, “is the transient, the fleeting, the contingent…” Surely nothing better captures many of the facets of the computer culture than the relentless pressure to be at the forefront, on the biting edge of technology, to be revolutionary. Our machines and the software that run them must be the latest models or versions and of course no matter how revolutionary they are you can be sure that they will be outdated almost as soon as they reach the showroom floor. Computer advertising abounds with images and slogans presenting this machine or that program as being the newest, the most innovative, the next stage, the final frontier. Everything is instantly outdated, and we find our selves playing the numbers game: 386, 486, Pentium, 3.0, 4.0, 4.1.2, 5.2, System 6, System 7. The business of computers is the business of ever updating numbers. A ubiquitous image of the so-called computer era is the ceaseless updating and flow of brightly lit numbers on monitors as they constantly scroll across the screen signifying a reality that never stops or rests. We are constantly being updated, improved, upgraded. The world has turned digital and the digital is fleeting. The Internet changes daily. Discussion groups, digital communities, muds and moos, virtual identities form and break-up in the nanosecond temporal zone of cyberspace. We crave access to the latest, most up-to-date information. CNN is no longer fast enough: we take to our computers to read and disseminate the latest information about earthquakes, hurricanes, and O.J. Nodes appear and disappear as this group goes on-line, as that individual logs on, or this one logs off. Log on today the Internet is one thing. Log on
tomorrow and who knows what you’ll find. Or won’t be able to find, for the Internet lies in an ahistorical zone in which nothing lasts and little is permanent. USENET articles are continuously posted and then disappear, usually in a matter of two to fourteen days. E-mail flies around the world in seconds only to be deleted and lost forever, nothing more than a vague digital memory in someone’s wetware. Computers, then, are heavily implicated in the modern creed of newness: whether it be the business of selling computers or the business of creating a computer culture, the emphasis is on the fleeting and transitory, the new and revolutionary, the next frontier in computing power.

While this is a general feature of modernity, even a cursory look at the literature on modernity shows it to be more complex than this suggests. And indeed, the connections between computers and modernity run deeper than this surface similarity. Taking a second approach to this issue, I would like to draw on a model for analyzing modernity which, while overly simplistic, does have some validity in that it has been widely commented on in the literature on modernity, and it usefully allows us to see some interesting connections between modernity and the culture of computers. This model divides modernity into two often opposing frameworks represented by Enlightenment versus Romanticism. In order to bring out those features most commonly associated with these frameworks and the manner in which the computer culture easily fits into them, I will concentrate on two paradigmatic figures from this culture: the computer scientist in his lab and the hacker in his underground lair. While there are a number of significant similarities between these two figures, the constellation of images, signs, and stereotypes that revolve around them couldn’t be more different.
The broad features of the framework of Enlightenment are associated with an emphasis on reason and rationality, usually to the exclusion of the body, on instrumental or utilitarian concerns, on the notion of progress, a concern with the perfectability of humankind, and a focus on control and mastery, especially of nature and the human body as part of nature. All of these features can easily be found in any of the popular accounts of recent work in computer science and artificial intelligence. Most accounts, both popular and academic, focus on the steady progress humanity has made on the road from reason that leads from the Greeks to computer science, constructing a master narrative that leads from Plato, through the Enlightenment and on to Babbage, Turing, and our current spot in this mythic tale of progress. In Raymond Kurzweil’s *The Age of Intelligent Machines*, for instance, chapter 2 discusses the philosophical roots of AI and begins with Plato and the Platonists and includes sections on the Enlightenment and logical positivists. We can see this visually in Haugeland’s *Artificial Intelligence: The Very Idea* in which the introduction is preceded by a series of photos visually linking in the reader’s mind Copernicus, Hobbes, Descartes, Galileo, Hume, Turing, von Neumann, McCarthy, Newell, and Babbage: suggesting that the giants of AI go back at least to the time of Descartes and Hobbes. Other figures commonly cited are Pythagoras, Pascal, and Leibniz. Uniting these seemingly diverse figures is an optimism in the rational order of the world, an order that can be captured and represented in the algorithms and formal procedures of the computer programs which are then taken to be a testament to the success of AI.

These genealogies further attest to the significance of reason in the history of AI and the centrality of the mind over the body. Consider the almost constant conjoining of AI and mind or intellect: *Mind Children, The
Mind’s I, Computers, Minds, and Robots, Minds and Machines. The focus here is on the mind and on AI as capturing the formal, mechanical processes of the mind. Hans Moravec’s work in Mind Children offers the clearest example of the denigration of the flesh characteristic of both this strain of modernity and work in AI. A central concern of Mind Children is the downloading of the human mind into a computer, liberating it from its confinement in a body. Moravec looks to a time when the human mind can become a part of cyberspace itself, completely freeing it from any body-image, achieving the ideal of a truly bodiless mind, nothing but pure ego. “Ultimately,” he writes, “our thinking procedures could be totally liberated from any traces of our original body, indeed of any body” (“Pigs in Cyberspace” 20). The body comes to denote for many working in this field mere meat or wetware, a lifeless substance over which we have no control. Sherry Turkle’s The Second Self touches frequently on the loathing of the body and the desire to be able to fully control and master oneself characteristic of this group.

Extending our gaze a little further, we can focus on the computer lab and two final characteristics which we might take note of that are often associated with work in the computer field. First the connections between this work and the bureaucratic world of government and industry. Much of the reporting on computer science concerns the business aspects of producing new, smarter machines, robots or cyborgs that will do our work for us, expert systems to diagnose our illnesses, translate our languages, and find more oil. Secondly, this work is often represented as being done in clean rooms. We have come to associate computers to these white, pure, almost ethereal rooms in which the production of silicon chips takes place, often by angelic like workers swathed in white from head to foot. One half of the official story
behind the development of the computer is a story of purity, light, reason, and science.

Counter posed to the whiteness and purity of the computer lab, we have the underground world of the hacker. To the emphasis on reason, order, control, and progress generally associated with the Enlightenment we can counter pose the Romantic emphasis on intuition, transcendence, chaos and disorder, the uniqueness and eccentricity of the individual, characteristics of the hacker. Paul Mungo and Bryan Clough’s *Approaching Zero* details, as the book’s subtitle suggests, the extraordinary underworld of hackers, phreakers, virus writers, and keyboard criminals. Bruce Sterling writes about the digital underground, Katie Hafner of cyberpunks. Associated to hackers, in distinction to the order and cleanliness of AI, are viruses, criminals, the underground, the world’s nerds and misfits, its losers and loners hacking away at the dominant culture. They are the cowboys, the pirates, the phreaks, experiencing transcendence and liberation in the underground world of cyberspace, the heroes of the computer revolution and part of the alternative underground of late 20th century. Andy Hawks’ manifesto “What is Futureculture: A manifesto on the here-and-now technocultural revolution” links a number of alternative subcultures including psychedelic, rave, and cyberculture, the culture of hackers, defined, according to Hawks as people who use “technology and information in ways that deviate from the expected norms and mores and laws of society.”

Emerging from many of these recent accounts of hackers and from their literary counterparts, works such as William Gibson’s cyberpunk trilogy *Neuromancer, Count Zero*, and *Mona Lisa Overdrive*, is a very romantic tale much at odds with that narrative at work in AI. This opposition is exploited frequently in journalistic accounts of the computer culture and is perhaps no
where more evident than in Steven Levy’s June New York Times Magazine article on the clipper chip titled “Battle of the Clipper Chip: Cypherpunks versus Uncle Sam.” Both textually and visually in its photographs, Levy counterposes the tie and button-down world of government bureaucrats and scientists with the slightly disheveled cypherpunk world of t-shirts, long hair, and blue jeans.

The libertarian and anarchist values of hackers underscores their romantic outlook and further defines them in opposition to the perceived bureaucratic nature of work in traditional computer science. As Bruce Sterling notes, “Many hackers of the 1960s remember their professional apprenticeship as a long guerilla war against the uptight mainframe-computer ‘information priesthood’” (54). Hackers are out to liberate computers and information from the grips of government and business. In the worldview of magazines such as 2600: The Hacker Quarterly, Sterling notes that hackers are represented as “besieged vanguard of the truly free and honest. The rest of the world is a maelstrom of corporate crime and high-level governmental corruption, occasionally tempered with well-meaning ignorance” (64). The first three planks in Steve Levy’s hacker ethic are:

1. Access to computers—and anything which might teach you something about the way the world works—should be unlimited and total. Always yield to the Hands-On Imperative.
2. All information should be free.

Andrew Ross, commenting on this, writes:

This hacker ethic, which has remained the preserve of a youth culture for the most part, asserts the basic right of users to free access to all information. It is a principled attempt, in other words, to challenge the tendency to use technology to form information elites. Consequently,
hacker activities were presented in the eighties as a romantic countercultural tendency, celebrated by critical journalists…and new age gurus. (116)

Commentaries on hackers and programmers are rife with images of the misunderstood visionary working on the frontiers, the new gods creating new worlds and universes out of programming codes, creating new lifestyles if not new life forms, the contemporary, digital version of Dr. Frankenstein. The computer is more than just a tool for simplifying the mundane aspects of everyday life. It is a new form of experience, a way of life; it is, as Timothy Leary, Jerry Garcia, and Rudy Rucker have individually proclaimed, the LSD of the 90s. It’s an aesthetic experience, a search for the art of the hack, the beauty of programming code, values that transcend the mere utilitarian virtues of computing.

Now surely this contrast between the computer scientist and the hacker has been overdrawn. These types represent little more than abstract ideals, not living breathing human beings. Furthermore, we shouldn’t allow this contrast to obscure interesting continuities between these two types: the denigration of the body, the desire for power and control, the will to technical superiority, the connection to an almost exclusively white, male, middle class domain. Nonetheless, I think we can usefully see a division here between these two images that help to orient how we approach the various discourses that surround the computer.

Let me now make a third and final approach to the subject of modernity by drawing on Marshall Berman’s analysis of the modern experience in All That is Solid Melts Into Air. The weakness of the previous analysis of modernity in terms of Enlightenment and Romanticism is its failure to capture the manner in which these two frameworks are locked in a
dialectical unity. In order to bring out this dialectical unity and to justify my earlier claim that there is a benefit to connecting computers and modernity, I would like to draw some parallels between Berman’s analysis of modernity and the computer culture.

One of the key features of Berman’s analysis is that it preserves the dialectical unity that he finds in some of the earliest statements of modernity: those by Goethe, Marx, Baudelaire, and Nietzsche. As Berman explains, “To be modern is to find ourselves in an environment that promises us adventure, power, joy, growth, transformation of ourselves and the world—and at the same time that threatens to destroy everything we have, everything we know, everything we are” (15). Berman’s analysis of these twin frameworks of modernity allows us to see how they have been locked in a struggle with one another since the beginning of modernism and how those very same characteristics that are hailed as being modern are simultaneously responsible for what we feel are the worst aspects of modern life. As he points out, “Our most creative constructions and achievements are bound to turn into prisons and white sepulchres that we, or our children, will have to escape or transform if life is to go on” (6). What characterizes modernity most is its ambiguity, its inner contradictions, its irony. Berman’s account of the experience of modernity brings out this struggle and contradiction that he finds in 19th century accounts of modernity but believes has been lost today. Twentieth century invocations of the experience of modernity tend to swing between the twin poles of what Berman calls modernolatry and cultural despair. In both cases the complexities and contradictions of modern life, the ambiguities of modernity, are missing. As Berman writes, “Modernism is either embraced with a blind and uncritical enthusiasm, or else condemned with a neo-Olympian remoteness and contempt; in either case, it is conceived
as a closed monolith, incapable of being shaped or changed by modern men” and women I would add (24). Berman sets out to bring the dynamic and dialectical modernism of the 19th century to life again (35). And it is these two elements of Berman’s analysis, the dialectical and dynamic nature of modernity, that I think suggest interesting parallels to our experience of the computer.

Placing the computer in the context of modernity and refusing to see it as somehow ushering in a new age, allows us to understand it in terms of the dialectical and ambiguous nature of modernity. Almost since their inception, computers have been both hailed as liberators and saviors and damned as destroyers and imprisoners. Looking at accounts of the computer as moving us into a new age tempts us into making too sweeping and simplistic characterizations and predictions about this new age as being either a hopeful time of freedom and liberation or a time of great oppression in the information panopticon. Resisting this move allows us to see the historical, social, and cultural context in which computers arose and in which we are trying to make sense of them and to understand the complex ways in which they make both good and bad possible at the same time. The computer gives rise to an increased rationalization and surveillance of everyday life, but it also takes us from the Yippies to the hackers, libertarian anarchists of the computer frontier. Computers have opened up a new kind of space, a virtual reality or cyberspace, that creates new possibilities but has so far been populated to a great extent with the same old themes of sex and violence that motivated our fleeing from the old space. The computer allows us to bridge great distances in no time, or as Anna Paquin puts it on behalf of networkMCI, “There will be a road that will not connect two points. It will connect all points” and “There will be no more there. We will all only be here.” But it is that
selfsame technology that has created those distances and locked each one of us up in our cubicle. Computers have dislocated workers of every stripe in the name of modernization but has also opened up new fields of employment. At the heart of both modernity and the computer, then, is ambiguity and any account of the computer that fails to grasp these underlying connections risks falling into a false dichotomy in which the computer is either demonized or canonized.

A second key feature of Berman’s analysis of modernity is dynamism. His analysis draws heavily on the image of the city street and boulevard. This is where modernism takes place, in the city, amidst the hustle and bustle of the street. As Berman writes, the street “had always served to express dynamic and progressive modernity” (317). A central image of Berman’s analysis of 19th century modernism is the moving chaos of everyday life in the modern, urban environment. That sense of moving chaos is also found in the 1960s version of modernism, Berman’s own formative years in New York City. These images, though, are countered, in dialectical fashion, by another great modern image: the highway. Berman’s evocation of New York during and after Robert Moses’ transformation of that city brings out both the manner in which Moses’ highway plans, sometimes cutting right through the heart of established neighborhoods, were themselves motivated by the very same elements that led to the development of the city boulevard, despite the fact that their final result would be the destruction of that very experience. As Berman writes, “The city development of the last 40 years…has systematically attacked and often successfully obliterated the moving chaos of 19th century urban life” (168). Berman laments the loss of public space so central to the 19th century experience of modernity.
This loss of public space and the destruction of the urban environment in which the moving chaos of the boulevard brought together all walks of life, has continued unabated in these final decades of the 20th century and the resulting feelings of distance, separation, and fragmentation have been widely commented on. It is in the context of this loss, I think, that we can understand the rise and significant growth of virtual communities. The moving chaos of the city boulevard has migrated to the information highway of cyberspace. Freenets, muds and moos, electronic salons and cafes, are the contemporary analogue to the city boulevard, providing a space where people from all walks of life can come together and exchange and share information, commiserate with one another, and just plain rant and rave amidst the moving chaos of internet. And we fail to grasp the significance of this development if we don’t place it in its proper context. Thinking about the computer culture in the context of modernity allows us to see and understand the parallels between the decline of the moving chaos of the city and the rise of the moving chaos of the Internet. Additionally, we can see how these two developments are interconnected in terms of the loss of public space, a connection that would be obscured by emphasizing the postmodern context of the computer culture. Finally, these parallels suggest the inadequacy of the metaphor of the information superhighway. Berman and many others have pointed to the destructive aspects of highways, the manner in which they fail to foster community. Perhaps a better metaphor, then, for thinking about our current experiences with the computer and our hopes regarding its potential is the virtual boulevard. Such a metaphor seems to underscore one of our main reasons for migrating to life on-line: our search for that public space, that sense of community and connection that seems absent in our lives. Reflecting on the boulevard and modernity also reminds us that the threat and
destructive potential of the highway, including the information highway, is never far removed, that all that we thought to be solid can melt into air, and that our finest creations can become our worst prisons. The computer and the culture that it breeds represent both hope and hazard and an analysis in terms of modernity necessarily preserves these ambiguities and contradictions.