

CS 452 Collected Program Overviews

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ASSIGNMENT ZERO

COMMUNICATION is often difficult; one must develop a model for understanding another's thoughts and intentions - these are often orthogonal to one's own. Adjustments must be made to the frequency of others cognitive patterns. How you say a thing matters - keep mind of spacing between words and don't overload your conversational partner with information.

This program facilitates communication and interpretation of the messages. It is successful in the sense that the user is communicated clearly, promptly, and unambiguously the state of things, and further, the user may shape, in few words, reality without delay or loss of information. This functionality is described in detail bellow. It's eco-friendly : things run on thyme.

KERNEL ONE

THE higher cognitive functions of the human mind are conjectured to be enabled due to the structure that language provides. Society hence endows infants with both the ability to form organized thoughts and also to communicate them. Conversely, the discourse of individuals constitutes a society; a strange loop is formed, enforcing the sporadic breakthroughs of eons past via positive feedback. Society is thus structure in the present, which encodes its history in structural invariants that provide pushback forces allowing a low entropy state to be maintained. Society is thus context and control.

Having established communication in assignment zero, we move on the the problems of context and control in our first kernel milestone. A program a sequence of instructions that modify state. Many instructions are only meaningful in the context and assumptions of its past instructions. A single misplaced command or erased register value is all that is required to derail execution. A kernel virtualizes the CPU, allowing for the peaceful, indeed synergistic coexistence of multiple tasks.

KERNEL TWO (LOUIS)

EARLY childhood development is markedly impacted by the name given to a child by its parents. This moniker is imbued on the child not by any material process, but by repeated, direct, and structured communication. While a child may make noise to communicate to anyone who will listen, the adults utilize these sigils to directly and efficiently pass ideas to each other. By means of repeated messages, parents emboss a child's name on it from an early age. When the child has grown they have internalized their handle to such a degree that it becomes tied to their identity. Humanity is thus naming and messaging. Our realtime kernel now also supports naming, making use of an underlying messaging system to set the names of tasks and associate them with their task IDs.

KERNEL THREE

The beginning of the industrial revolution was marked by the development of steam power, enabling manufacturing and locomotion. Whereas an old Dutch sailor was compelled into an aesthetic contemplation he neither understood nor desired, face to face for the last time in history with something commensurate to his capacity for wonder, the inertial march of progress proved psychologically overwhelming. Post the revelations of Darwin, Freud, and Einstein, how could one maintain a static view of the context of humanity, the control one could exert on one's environment, or the continuity of mind and time. Literature reflected this, deforming mind and time in postmodern work, from the dreamscape of *Finnegans Wake* to the dissociation of Slothrop in *Gravity's Rainbow*. Indeed, one could not walk to a room in which the women come and go, speaking of Michelangelo, without the worries of eating a peach and disturbing the universe interrupting one's narrative.

In our third kernel milestone we forsake static deterministic execution, opening ourselves the overwhelming interruptions of the exterior world.

KERNEL FOUR

“In concert videos the guitarists face each other, instruments high and tight against their chests, reflecting one another on an invisible y-axis, shutting the audience out. The stances fit the songwriting: Foals are a band who offer their listeners little in the way of graspable emotion or explanation.”

THUS reads the 5.9 *Pitchfork* review for the debut *Foals* album, *Antidotes*. The band’s sophomore release was much better received and marked a genre shift that remained in the subsequent two albums. To the delight of critics, *Total Life Forever* expressed clear and appealing emotional intent with fewer words and less jagged edges, musically speaking. However, the *Pitchfork* review missed the complexity and intent of *Antidotes*. One notable track is paced with halts and jumps and conveys some degree of anxiety in its fragmented lyrics, which describe physiological and quantified psychological responses to the feeling of love. As opposed to not communicating clearly its meaning, the song clearly communicates a lack of clear communication; a qualia which many find natural is interpreted as confusing and foreign. Much effort is placed in a failed attempt to describe state in parameters projecting orthogonally to the single dimension of meaning.

Similarly, a young Hal Incandenza in *Infinite Jest*, who can recite the OED from memory, is faced with psychotherapy sessions after the death of his father. As opposed to clearly communicating his state, he digests recreational, pedagogical, and professional literature in psychology to avoid *failing* the meetings. The opening chapter, occurring chronological last, reverses this situation. Hal has clarity of meaning and intent all while communicating zero bits of information to his audience. Effectiveness of communication is inversely correlated with the effort taken to produce it. Effective communication is perceived as natural and follows immediately from perceived social cues of one’s conversational partner.

In our fourth kernel milestone we open the traditional communication channels instead of relying on busy waiting to communicate with both the user and the trains. While this incurs a level of difficulty, that is rewarded with the powerful userspace freedom of asynchronous task I/O.

TRAIN CONTROL ONE

WHEN I was seven years old, I set out one day determined to discover whether or not I possessed telekinetic abilities. The conjecture was, as I outlined to myself at the time, that, noticing my decreasing level of clumsiness, one makes gestures more from memory and less from improvisation as one ages, hence the absence of this skill in adults could be explained by their being remiss to preform these experiments while young. I sat in my room and stared at objects, harbouring an intense psychological desire and focus that any *fair* universe would reward by yielding its control to my mind. *Nothing moved*.

The universe is apathetic to desire or expectation. One cannot wish a object or event into existence. It would seem that the conclusions I ought to have drawn from this investigation, paralleling the general disillusionment of childhood naïvety upon entering the adult world, would have been that the human mind is feeble and that functional living comes only from imitating the social motions of society, accidentally designed by eons of trial and error.

The lesson I learned, however, was starkly different. Suppose a benevolent universe, concerned with human life, were in place. Then the stability of an architecturally daring skyscraper, the precision of an engine, the intricacy of microchips, and the accuracy of statistical models for high energy physics, all could be handouts from the actual powers that be. Abandoning this hypothesis leads to the conclusion that mind is in fact able to modify the universe in unprecedented ways, and has at an increasing pace through history.

Through its uncaring nature, bending to the will of no man, the universe is able to produce regularity. The task of mankind is to discover regularity, and through ingenuity, permit a three pound organ, consisting largely of fat, to shape the world through thought alone.

In the first train control milestone, we produced an accurate model of stopping distance that was defined by only two parameters (and the provided distance data).

TRAIN CONTROL TWO: THE PROGRAM

Finished, it's finished, nearly finished, it must be nearly finished. Grain upon grain, one by one, and one day, suddenly, there's a heap, a little heap, the impossible heap.

-Beckett, *Endgame*

OUR kernel development defined the possibilities of interactions of tasks in the real-time system. The blocks of our system, either tasks or constituent functions, are short elementary pieces of code, themselves non-monolithic. The first train control milestone produced the fundamental structural unit of the system - a tangled logic across tasks that accomplished the goal of controlling the movement of a train. The second train control milestone implemented protocols for the interaction of two of these fundamental units. This was accomplished by setting straightforward rules, lacking intricacy and far from optimal, to ensure the units interacted correctly - that the trains controlled did not collide. Thence the control of a single train is fundamental in the sense that its parts are not units of function, and that interaction among fundamental units is far more simple than their internal complexity.

ITS OVERVIEW

WE have anthropomorphised the results of each previous assignment. Assignment zero was about the difficulty of communication. Kernel one was about how the context of human evolution, both biologically and sociologically, resulted in the equilibrium of society and control of its trajectory. Kernel two and three expended on the structure of this society and on the forces that must be counteracted to maintain it. Kernel four observed that the most successful communication was concise and simple.

Having produced the fundamental structural unit in the first train control milestone, we shifted away from the perspective of a human in the context of their society, to the perspective that society is just a byproduct of the inherent ingenuity of human thought. All interactions among people convey only an approximation of the complexity of the thoughts of their participants. The net effects of these sub-optimal manoeuvres could not possibly be the etiology of an individual's complexity.

THE THEME

Russian mathematician Israel Gelfand delivered a lecture for his receipt of the Kyoto prize, which honours the holistic contribution to humanity of the recipient's technical work. Titled, *Two Archetypes in the Psychology of Man*, this lecture was on the the two conflicting human functions of wisdom and intellect. Wisdom is derived from experience, delivered to the individual by society. Intellect is ingenuity in fundamental opposition to the genetic and social conditioning of an individual, as observed from the patterns in society.

The outline of the lecture is as follows: Gelfand provides examples of the serious social conflicts that arise from the discrepancies of these views. This is the conflict of technocracy to the view of technology as evil, the conflict of illustrating the concept of a point to a student in saying that it is *that which has no part*, appealing to intuition, and of taking a formal axiomatic approach that enforces rigour and eschews loose intuition, the conflict of a model to the reality that it is modeling - in all technical disciplines (he speaks of his experience in biology, medicine, and computer science). He postulates that the cause of these conflicts is lack of an adequate language that can express both archetypes. For example, Hilbert showed that Euclidean geometry could be placed on fully rigorous ground. If one abandons the classic definition of

a point, focusing only on axiomatic relations between a point and other geometric objects, one can purify the theory. Indeed one could take points to be classical planes, and planes to be classical points - the duality of projective geometry does not care as three generic instances of one defines a unique instance of the other. A mathematician must have both intuitive and axiomatic understanding to conceive new results, hence, although the language differs, there is no fundamental divide between the views. Gelfand explains that mathematicians are capable to and responsible for producing such a language, which must describe the abstract notion of a fundamental unit: indivisible into complex systems, and interacting mutually in a far less complicated manner.

CS 452 is a course which clashes precise theoretical models with imperfect reality, the ability to perform any single task well with the requirement that necessarily less complicated protocols govern their interaction, and the creation of elegant, suddenly inspired, solutions with the inelegant and time consuming act of debugging. Computer science is a human field of study, and, in the course of these introductions, we have explained how the field's problems are reflections of a universal psychological dilemma fundamental to the human condition.