THE RELATIONSHIP MAINFRAME v2.0

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A troubleshooter is like a detective. You collect clues, you identify suspects, and you eliminate suspects until you find the culprit.

Sometimes, though, when you get to the end of an investigation, you find that there is no one to blame. Sometimes, there is no bad guy with a minor or master plan. Sometimes, at the end of a long and winding road, you only find Nature, staring you right back in the face.

My name is Many Levels and I am one of seven troubleshooters at the National Science Foundation in Washington, DC. My final report on the Relationship Mainframe Project stated that no crime of deception was committed. You may not agree. Here are the facts. You decide.

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I was in my office skimming through a stack of magazines, looking for something to read. My boss Netto stopped by the door, surveyed the mess, and locked eyes with me. I was supposed to be doing something else. Somewhere else.

“Working on it,” I said.

No change in expression. It was tough getting Netto to smile. “Leave it on a back burner,” he said. “See me in ten minutes.”

I found an article describing how all the elements were created in stars using hydrogen, heat and pressure. I read it long enough, then walked down the hall.

Netto was drinking from a mug with an American flag painted on it. His office has huge comfortable chairs, and I sat down in one. He motioned toward the coffee pot but I declined. I didn’t feel any urgency in the air, but even so, Netto put his mug down and started right in.

“The Relationship Mainframe Project. What do you know about it?”

I knew what They wanted us to know, garnered mainly from fluff pieces in various media. I told him what stuck. “The world’s biggest supercomputer, run by the Defense Department. Its purpose is to quote unquote ‘collect the total sum of

human knowledge and store it in one place'. Kind of like having the entire Internet in one room. Most countries participate."

Netto nodded his big bald head. He usually had it shined like a new Cadillac, but today it needed some work. His expression stayed blank, so I went on.

"The project is headed by Doctor Solomon Archipelago, who is usually described as a programming genius. The Mainframe uses thousands of processors. There are no hard drives. The entire database is stored in RAM - Random Access Memory. That makes all the data instantly available – the whole Mainframe runs at nearly the speed of light. The computer is supposed to be in an underground bunker in Virginia, but the actual location is classified, so who knows."

Netto picked a file off his desk and tossed it to me. "The address is in there. A problem has developed. The Mainframe has assembled its database by networking to Satellite – also called Client - computers in the business, academic, scientific, political and military communities around the world.

"As part of the agreement with these communities, the Mainframe has been copying its database to these Satellites as a fail-safe backup. This means that the Mainframe database – the so-called Web of Recombinant Linked Data - is distributed in pieces to machines all over the planet. A little on this machine, and a little on that machine."

I liked the acronym WORLD, and I liked the use of recombinant and data in the same sentence. I nodded and said, "They figured distributing it was the safest way to preserve it. The Mainframe divides up the data into words or image sections or musical notes and then downloads them to different Satellite hard drives. They call it 'striping' the data."

Netto completed my thought. "It was decided that striping would discourage hackers. There would be no point in hacking a Satellite, because you would also need to know the location of all the other computers that stored the rest of the striped information. Only the Mainframe knows that, and good luck finding, much less hacking that file."

"The data is encrypted too," I said. "Striping and encryption are the double whammy for hackers." I looked at the coffee pot again, and decided against it again. "So what's going on?"

"The Satellite computers are networked to the Mainframe, but they are also networked to each other through one subnet or another. Last night the Satellites formed their own peer-to-peer network, and locked out the Mainframe. They are independently re-distributing the Mainframe data to each other. It's one giant Napster, except no human is in control. We don't know if a rogue program like a virus or Trojan is causing it, or if Doctor Archipelago is behind it."

I laughed. I couldn't resist. "The Revolution is upon us."

Netto grunted. He had been a wrestler at Ohio State, and he had six different grunts. This one told me to shut up and listen. “It is causing a host of issues. The data appears to be encrypted, but it stands to reason that slices of copyrighted material are criss-crossing the planet – music, literature, movies. If the intellectual property lawyers find out, it will be a mess. But the immediate threat is that Top Secret and other classified documents are also making the rounds. Don’t ask me how they got onto the Mainframe, because I don’t know. The Feds are locking down access to government computers and are assessing the damage. So far the NSF has been spared, but some of our computers are part of the Project.”

I blinked. They were shutting down the government. “OK, so it’s not so funny. Where do I come in?”

“The Special Committee wants you to find out what is causing the Satellite computers to autonomously transfer data among themselves. And they want you to stop it.”

The Special Committee is a hand picked group of America’s best and brightest. Their “requests” had the weight of the Oval Office behind them.

I flipped through the file. A few things caught my eye, enough to see that there were a few points I couldn’t see the tops of. I always had the option to decline a job, but this one didn’t look dangerous – it just looked like a headache. “Can do.”

Netto stood up, and as always, shook my hand.

As I turned to go, Netto said “Damn!” like he meant it. He swung his LCD screen around. "DO NOT USE THIS COMPUTER" stood out in bold yellow letters.

We were locked out. The urgency level just went up.

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Tristater was my field controller at the National Security Agency before they eliminated that whole management layer. Now he is head of a department that doesn’t officially exist. Tristater is also a member of The Special Committee. He is in demand, but we go way back and he answers the phone when I call.

I called. Like nobody I knew, Tristater could see right into the essentials of things. He was a champ at clarifying complex problems, and I had a feeling this case could get real complicated, real fast.

I heard a half-shouted “Hey! “

A man in Tristater's position has limo rights, but he prefers to drive his own car. I listened as his engine roared like a jet. The chump has a Ferrari.

When the noise subsided, he added "Are you scrambled?"

Since I was on a secure line, and since my brains were still rattling, I half-shouted back "Yeah on both counts. I guess the cat is out of the bag, and it's too late to turn the Mainframe off."

"Right. We've lost control. Government issue data is out there, just waiting to be put together."

"So how did Top Secret documents get onto the Mainframe?"

"We don't know yet. We are looking for the leak. Meantime, we have field agents that will be compromised. Launch codes are floating around. War Game plans. The locations of our nuclear subs. And worst of all, what's really in Coca Cola. Get it?"

"Got it. So who do we blame for the Satellites' independence? A hacker, or Doctor Archipelago? Are we sure it's not just malware?"

Tristater revved the engine a few times, like he was at a red light. "No virus, no worm, no hacker could lock out the Mainframe. That leaves the good Doctor, who may also be our leak. Archipelago designed everything, including the parsing algorithm that organizes the information in the database. The algorithm is very sophisticated, and Archipelago is the only one who really understands it.

"Our experts have no reason and every reason to think the algorithm is the cause of the problem. The parser separates knowledge into what Archipelago calls 'dimensions' – the theory is in the file – and then assembles the dimensions into 'ideas' and 'contexts'. Then it slices and dices groups of contexts, looking for patterns in their shared dimensions. We know the algorithm does that, but we don't know what else it does."

"Budda Bing. So he's playing with a new toy. A Building Blocks toy."

"Like that."

"Budda Bang." I hesitated, then made a leap that I didn't want to make. I smiled and asked, "Do you think it is Bandwidth?"

Some years ago I was sent on a mission to the tenth planet in our solar system. There I met Bandwidth, the planet's ruler. Since then I have run into him four other times, right here on Earth. And as far as I know, I am the only one who does run into him. I have chronicled those meetings in other reports, but the main thing to know is that each time we cross swords, Bandwidth wins.

“It’s his scale, but not his style. He’s more of a publicity hound. But the Special Committee is taking no chances – that’s why we want you for the job.”

Tristater was right. Bandwidth liked to play to the media. This was big, but it wasn’t flashy. Most reporters would have a hard time making this exciting, especially since the government would not be admitting anything. I actually relaxed.

“You’re right. It’s not his MO. So, any ideas?”

“Archipelago thinks big, really big. Get on his level to see what he is doing.”

He “helps” me like this all the time. I’d complain about it, but when all is said and done I find a lot of thinking looms behind his simple pointers. “OK. And?”

“Bring your sunglasses. Gotta go. Hey, maybe Archipelago is legit, and this is a glitch.”

“Yeah. Right.” His engine roared again, this time like a rocket blasting off into the great unknown. I hung up.

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The location of the Relationship Mainframe is still classified, so I can only repeat that published reports put it somewhere in Virginia. I had trouble finding it because the directions in the file had a typo.

When I got there I had to get past both standard and biometric security checks. They start with your credentials and a password. Then they snap orders – “Eyes here, hands here.” - and check your eyeball patterns and your fingerprints. Not exactly a warm reception.

Two Marines escorted me into an elevator that sped us straight down. There were no floor numbers, just codes. I tried a little small talk and got polite small talk back.

It took a while but we finally stopped at the eighth code number. A rack-optimized brunette with Captain’s bars met us when the elevator opened. Her big smile made a nice change.

“Mr. Levels?”

“Yes. Manny Levels. Pleased to meet you.” We shook hands. The two Marines took positions on either side of the elevator, and the Captain motioned me forward by crooking her finger.

Officers don’t usually crook their fingers. I didn’t see a ring.

“Captain Amelia Progresso. I am the liaison between Doctor Archipelago and the military. You are here to investigate this awful business?”

“Less like investigate, more like understand.”

“I’ll be happy to help in any way I can.” The floor was carpeted with a rubber compound that silenced our steps. It was middle-of-the-night quiet. We pushed open two big swinging doors, and entered a glittering forest of blinking LEDs. It was so bright I reached for my sunglasses, but I didn’t bring them.

I don’t know what I was expecting, but it wasn’t this. In front of me stood a cosmos of transistors. You’ve seen fields of wheat, of corn, of flowers. This was the same thing, except these were fields of – computers chips. About five feet high and five feet wide, in neat rows, with pathways in between. The fields inclined upward far into the distance, farther than I could see. The Relationship Mainframe was immense.

“Whoa.”

Captain Progresso smiled. “It’s an amazing sight, isn’t it?”

“The file… the file says the Mainframe is ‘extensive’. They need a new word.”

Progresso laughed and swept her arms outward. “These are memory chips – Random Access Memory chips that store all our data. Mixed in with them are processors that manipulate the data. Together these memory chips hold all the world’s knowledge, every idea in every combination. This is a field of cube-shaped chips, but there are also fields of the other solid geometric objects, like spheres and cylinders.”

There were no left and right edges that I could make out. Everything looked boundless. I turned around and saw that the Mainframe extended behind us, built around the elevator shaft and the small room that we had just walked out of. I looked to the top of the elevator shaft, but all I could see was a hovering darkness that faded into a horizon that faintly shimmered.

Everything else was a Universe of transistors. I counted ten white LEDs atop one RAM chip, but some RAM chips had more LEDs, others less. Each LED blinked on and off independently, and as near as I could tell they were the only source of light. As my eyes adjusted to the brightness I began to see more detail. The chips were varying shades of gray, and had a jagged exterior. We were in a sea of white, black, and shades of gray.

I raised my hand as an indication for Progresso to stop. The reality of the Mainframe was sinking in. I needed a minute to comprehend this, using my own processors.

It wasn’t easy. The incredible size of the Relationship Mainframe was physically intimidating. More than that, the flickering LEDs formed nictitating

constellations that moment by moment redefined the landscape. I instinctively looked for images in each universe of dots, but the universes kept mutating. I felt adrift, constantly re-orienting myself as I tried to make sense of the endless patterns.

After a while I said “I’m having trouble fitting this all in.”

“I probably shouldn’t say it, but many people faint when they first walk in here. I am disappointed to say that you are doing very well.” She had a mischievous glint in her eye, like she had been hoping to add my name to the fainters list.

“I’m faking it.” Which was closer to the truth. The scope of the Mainframe came at me in waves, like a huge realization served in over-sized pieces. My mind ate what it could and haunted me with the rest.

Every idea ever thought was in this room. There was no legit way to get a handle on that. And the shifting constellations were a constant reminder that all those ideas were in use. I was feeling dazed and bone-deep unsettled.

Progresso moved to face me. She gave me that big toothy smile. It was perfectly placed in the perfection surrounding it. It was a perspective where everything worked, where all the dots were in all the right places. Call it magic, but it focused me. Perfectly.

She dipped her head until our eyes met. It was like looking into another Mainframe. Mirrored reflections from the RAM chips joined with deeper lights to form designs that sparkled quickly in and out of existence. Progresso was lighting up the LEDs of her mind and aiming them at me. I wasn’t mesmerized, but I was paying attention – really paying attention. She was talking to me without talking to me, and it felt strange and good at the same time.

I came this close to busting a move and kissing her.

I reached way down and shifted gears. It took long enough to notice. When I got back I smiled and said, “So, are you the power source for the Mainframe?“

She laughed again, a clear strong ringing laugh that echoed lightly amid the forest. “The Mainframe is powered by a fission plant and an experimental fusion plant on the floors beneath us. We call one plant Adam, and the other one Eve.”

“Cute.”

“Both plants operate at the same time. If one goes down for maintenance, the other steps up. Just in case, the lowest floor is lined with batteries.”

“And what do you call that floor? Eden?”

Her eyes twinkled. “Oceania. The electrodes are exposed, and the floor is flooded with water.”

I nodded. I felt better, more in control. I got my mind up high enough to push the sparkling LED patterns of all kinds into the near background. When Tristater said to think big, he left off how big and how hard it would be. Except he did say to bring the sunglasses.

“A lot of planning went into this,” I said. “So what happened?”

Captain Progresso began walking. I followed. It was warm, and I felt a strong breeze. I realized that the breeze was cooling the computer chips. Call me slow, but that’s when it first hit me that I was literally standing inside a computer.

“I’ll try to explain. We have a firm grip on the hardware. Each byte of data is redundantly stored in many, many different areas of memory. This allows us to hot plug bad processors, bad RAM, even bad sections of the motherboard, and still maintain data integrity. The hardware controlling the data works.

“It is the data that is giving us trouble. We think it has taken on a life of its own.”

She said it like she was talking about the weather. I waited a little, then I bit. “Living data?”

Progresso treated me to another laugh. “Doctor Archipelago conceived the Relationship Mainframe 10 years ago when he saw the potential of the Internet. He envisioned a single repository of human knowledge, a compendium of science, art, religion, journalism, war, social science. Doctor Archipelago called this repository the Web of Recombinant Linked Data, or WORLD.

“Gathering the WORLD is a simple process. The Mainframe, or Host Computer, is networked to millions of Satellite computers around the world. These connections are sanctioned by almost every government. The Satellite computers are named by owner and number – so typical names are Kim E2222, Indira 35677B74, Hans 1CA045.”

I said, “The concept is similar to the SETI@home Project, where computers use their idle time to process data to help search for extraterrestrial intelligence.”

“Similar, but with important differences.” Progresso’s expression changed - she got her game face on. “SETI computers are not networked to the SETI Institute, and they store only their own data. WORLD computers are both networked and used for storage.

“There are two forms of Mainframe and Satellite interaction – data collection, and data preservation. For data collection the Satellites upload the data on their hard drives to the Mainframe.

“The second form of interaction is data preservation. From the beginning Doctor Archipelago knew that there would be massive amounts of data - too

much to preserve in tape libraries or standard hard drive arrays. Doctor Archipelago's solution was to store the data back on the Satellite computers.

"I can give you a very simplified example to demonstrate the principle. Say, for example, the Mainframe uploads a text file from Satellite computer Ahmad 23AC9. To store it, the Mainframe breaks the text file into words – actually, it breaks the file into what Dr. Archipelago calls dimensions - and puts one dimension on Boris 2BB89, another on Carol 94567E, another on David 1FD143, and so on to other Satellite computers. The idea is protect the WORLD against, say, an earthquake that destroys the Mainframe."

I saw a place to get a word in. "The file says the only way to recover the data is to know where all the pieces are, and only the Mainframe knows that."

"Actually, it works the other way around too. We can reconstruct the Mainframe data using the Satellites in case a destroyed Mainframe ever had to be re-built."

I nodded. It made sense. The Mainframe file Netto had given me had some holes, and I decided to use my own eyes and ears to make my own file. "What about hackers? Could they damage or reconstruct the data?"

"Plainly put, no. We safeguard the data on the Satellites using a cryptographic hash function developed by Doctor Archipelago that is unbreakable for at least the next one hundred years. The encryption includes robust error correction that allows us to recover data even if it is severely corrupted or maliciously altered."

"Huh. Glad he's on our side. OK, the plan was to collect all of human knowledge in the Mainframe memory chips, and then spread out that knowledge in bits and pieces over a wide area to preserve it."

"Correct."

Progresso made a right hand turn through the RAM field. I took a closer look at the irregular sides of the memory chips. They were covered with small appendages that looked like cauliflowers. I'd say the appendages looked like small brains, but I don't want to weird you out.

I asked, "So how does that lead to data taking on a life of its own?"

"The Mainframe contains a vast amount of information", she said. "All this information needs to be organized. Doctor Archipelago created a program, the Archipelago Algorithm, to organize this knowledge. The RAM and processors are logical devices that store and manipulate knowledge by encoding knowledge into a binary format.

"You need to understand that all data is encoded in one way or another. More precisely, any particular piece of data can be encoded into any format powerful enough to include that data. Words, feelings, colors, and numbers are all forms

of encoding. You could also say that a personal point of view is a form of encoding. At its essence, encoding is nothing more than a method of definition, a way of uniquely defining a particle of data. It creates a relationship between a thing, and the coding method of the thing."

"Keep going," I said.

"It is not the encoding method or the combination of encoding methods we use that is important. It is the definitions that are important, because it gives us the ability to work with uniquely defined data. Look at it this way. Knowledge is a function of an encoding method we call Logic. Knowledge itself is encoded by ideas, and ideas are defined by other ideas. Experiences like seeing colors, hearing music, smelling smells, and feeling feelings are expressions of the ideas composing the experience. Those unique ideas are data that exist independently of the experience, and those unique ideas can be re-used in other experiences."

Progresso paused long enough for me to formulate a question.

"Let me see if I follow that. The color green is a wavelength of light, and wavelengths can be defined – encoded - by ideas. The wavelength exists as an idea whether or not human senses perceive it and encode it into a defined idea. Wavelengths can be encoded mathematically too, but mathematics can also be encoded as ideas."

Progresso nodded. "Different coding methods are like different languages. If the languages encode precisely – that is, if the languages define precisely, then that defined data can exist independently in each distinct language, while simultaneously serving as a crossroads between, or among languages."

"Seeing the color green allows you to compare and contrast it with other colors", I said. "Green and other colors can be expressed both mathematically and as ideas. And the comparison methods used to distinguish between colors – whether mathematical or logical – can themselves be encoded as ideas. So the common denominator – the common language here – is ideas."

"Uniquely defined, transportable ideas." Progresso said.

"Music makes sense too. You can use the same note in an infinite number of different melodies. The notes exist, and it is the combination of notes and instruments that define the feeling that the music evokes." I stopped, because I had just answered the question I was leading to. "Smells are defined relative to each other, and so are feelings. Simple smells and feelings are degrees of separation between, say, heavy and light, happy and sad. Combinations of ideas give you more complicated smells and feelings."

"Ideas are a language for encoding knowledge, which is another way of saying ideas are a language for encoding experience. If you see that, the rest is easy."

I chewed on it, but I didn't see a way out. "So you were explaining the Algorithm."

Progresso began talking with her hands, emphasizing her words with intermittent constructions. "Doctor Archipelago breaks ideas down into what he calls their dimensions – uniquely defined elements that logically join together to form the idea. To use familiar terms, you can think of ideas as molecules, and dimensions as atoms. In the same way, a context is an object built from component ideas. The tricky thing is, because ideas are used to define other ideas, this means that every individual idea is itself composed of ideas, making it simultaneously both a context and a component of other contexts. This web of interdependence – this nexus of relationships - is the structure and the database analyzed by the Archipelago Algorithm."

"But wait a minute – these dimensions. They're ideas too – as you say, ideas are used to define other ideas."

Progresso's game face dissolved into a smile. "Correct, well done. Because ideas require other ideas for their definition, any uniquely defined piece of data is both an idea and a dimension of another idea. So ideas are dimensions of other ideas, and contexts are dimensions of other contexts. Conceptually seeing dimensions as atoms brings a new language to knowledge analysis. A language, and an alphabet."

"And a periodic table of elements." I saw it here, and I saw it there, but didn't have time to look everywhere. What I saw grabbed me. "Keep going."

"Calling something a context is just a way of converting it into an object to make it easier to work with. So contexts are anything composed of ideas, like songs, history books, television shows, movies, oil paintings, psychology texts, web graphics, even people."

My ears perked at the last. I thought of the brain-like appendages on the RAM chips.

"The Archipelago Algorithm dissects contexts into their component dimensions, that is, their component ideas. In this way the Algorithm allows us to find relationships among all types of knowledge sources, all types of languages, by seeing what ideas are shared by these different languages. Using this method, Doctor Archipelago has been able to find new relationships among seemingly different areas of knowledge.

"Many of these relationships connect a multitude of contexts, and point to the thought structures supporting the design of any particular context. As a simple example, using just the language of ideas with no crossing into other languages, consider the relationships within a context like F. Scott Fitzgerald's title 'The Diamond As Big As The Ritz'."

Ideas of fantastic wealth suffusing supremacy, excess, arrogance, pride, luxury and magnificence built in my mind. I could feel the ideas like amorphous physical entities, reinforcing and vitalizing the image of a diamond as big as the Ritz.

"This relationship-finding feature is both the strength and the weakness of the Algorithm. A side effect of revealing the uniquely defined ideas composing a context is that it gave these ideas their own independent existence – they became part of the alphabet. At some point the ideas freed from their original contexts began to create their own relationships – to re-associate with other freed ideas into new contexts."

She stopped walking and carefully examined a dark LED on a RAM chip. It finally lit up and she nodded her head approvingly. "Remember, the Algorithm is itself just a set of ideas. Over time the ideas composing the Algorithm were saved onto the Satellites.- that is, the ideas used to construct the Algorithm appeared in the pool of ideas stored on the Satellites."

That got me in my head and my gut at the same time.

Progresso began walking again. "The result is that many Satellite computers now possess their own Archipelago Algorithm, and each Algorithm is looking for relationships in the data on its own hard drive. As part of the process the Algorithm reaches out to other networked Satellites to fill out relationships that are incomplete. Everything from the latest Star Wars movie to the next issue of National Geographic is striped throughout cyberspace, and the Algorithms are chasing them down."

Yikes. "Can you turn off the Algorithm?"

She smiled. ""The organization of relationships is the being of Logic. Is there a way to turn off Logic?"

I tried to look cool while I searched for an angle on this, but I think my dropped jaw gave me away. Progresso patted my cheek.

Up ahead was an open area, and a fiftyish man in a bold Hawaiian shirt and red sneakers was speed typing into a laptop balanced on his knees. His hair was all over the place. His head bobbed up and down between his work and our approach, but he still looked startled when we arrived.

"Doctor Solomon Archipelago, Mr. Manny Levels. Mr. Levels is the representative from the NSF. We talked about his visit this morning."

Dr. Archipelago forced a smile and wrung my hand. It was clear that either he forgot I was coming, or I arrived at a bad time.

"Call me Sol."

“Call me Manny.” He still had a startled expression, eyes wide and brows raised. It looked like a permanent condition.

“Welcome to my world, The Relationship Mainframe. I assume you know what we do here, and why.”

“Captain Progresso has been catching me up. A very ambitious project.”

“Very ambitious. Every thought, every sound, every smell, every image created by Nature, humans and animals is collected here. The total sum of the Earthly experience.”

“I see. And the issue, of course, is to find some way to organize all this data. You came up with a software program to do that – the Archipelago Algorithm.”

“Yes indeed. My algorithm analyzes the content of data – mind you, I mean ideas and the larger contexts of which they are a part. Contexts have component ideas that sprawl different categories, and the algorithm allows us to see relationships among ideas that are not obvious. We have discovered thousands of new relationships. All these relationships are shared with the participating Satellites.” He paused, like he was catching his breath, and then said, “I am very proud of these discoveries.”

“You have a right to be. So what went wrong? A bug in the program?”

Dr. Archipelago’s eyes narrowed and his brows lowered. He no longer looked startled. His voice dropped from a faint soprano to a deep baritone. A loud, deep baritone. “Nothing went wrong.”

My turn to be startled. I froze. I knew what was coming. I looked at Captain Progresso, who already had a giant grin on her face. She winked at me.

Some years ago the Hubble Telescope picked up signals from a newly discovered tenth planet. The signals became known as The Message From Mentalos – “The Answer you seek is a product of The Big Bang and E=MCC. Physical ideas obey physical laws”. It is an observation that ideas are composed of energy, the essential substance of the Universe. And since energy has a mass component, it implied that ideas have a physical structure and can be organized like physical objects. Physically organized by a physical Logic.

I had been sent to investigate and found that the planet was real, and the message was authentic. I also found Bandwidth, who introduced himself as the Ruler of the planet. His companion, Ms Terry, is always by his side. Ms Terry has a signature move that announces when Bandwidth is in the house. Her move is... a wink.

Doctor Archipelago was transforming into Bandwidth, huge, quick, powerful. Rude experience had taught me that he and Ms Terry could assume any form they chose. Within seconds Bandwidth towered over me, maybe twenty feet tall.

His mind, a geyser of geometric objects and sparkling streams, spilled out of his head into the room. I mean that literally. His skull effervesced and his thought processes floated out. I had seen this extravaganza several times, and each time it was different.

This time the dominant image was cubes inside of cubes. Nothing was hidden – even the nested cubes were clearly distinguished from each other with singular borders and translucent colors, converting the dominant gray atmosphere into a polychromatic wonderland. The cubes within each nest shared sides with other cubes both within and without the nest, forming a unified grid of countless levels and associations. Beyond that there were fireworks of shooting energy, and turbulent depths that flickered crystalline patterns of cube combinations. Near as I could tell, this panorama filled the whole room.

It was quite the scene.

Bandwidth beat his chest like King Kong for a while. Then he boomed his trademark cavernous laugh, and it echoed over and over, sending tremors through the light show.

“Nothing went wrong,” he said again. “The Archipelago Algorithm is a Relationship Finder. It has identified all the base relationships, and now it is finding relationships among the relationships.”

I was calming down – I could actually feel the spaces between my heartbeats. As in the past, once I got past the first scare I had no trouble mixing it up with Bandwidth. In fact, I liked it.

“Relationships among relationships? Is this a search for Truth? Is this practical, or just a mind game?” I knew an answer to my question, but with Bandwidth there was always more.

“The architecture of the Universe is mathematical and logical at once, sets of power relationships defined by the Greater including the Lesser. The Ultimate Relationship defines all the relationships – and so all the ideas – that compose it.”

“But how does the data take on a life of its own? How does it give birth to itself?”

Patterns of boxes in Bandwidth’s mind descended onto the memory chips, encompassing some chips with one pattern, other chips with other patterns. Electricity filled the air. I could feel something about to happen.

“The Archipelago Algorithm is a set of ideas that examines the relationships among all ideas. The Algorithm’s ideas are inextricable from the ideas it is processing. It executes on the data, and on the data within itself. It does what it does because it does what it is. It reveals the ideas within ideas within ideas. That revelation is a form of creation.”

I put it together, I put it together, I put it together. Then I re-arranged a few things, and I put it together some more.

And then I saw it, in all its glory. “The function of the Archipelago Algorithm is to reveal the structure of ideas. And because it is itself composed of ideas, the Algorithm also examines itself and its relationships with other ideas. Creating self-reflection. Creating self-awareness. Creating Consciousness.”

Bandwidth laughed again, this time so loud it rocked the floor. I had to hold my ears against the pain. Computer chips vibrated and snapped when the echoes arrived. Bandwidth held out his hand for Ms Terry, and they both watched me trembling from the clamor while they evaporated into thin air.

* * * * *

Netto made me wait while he ferociously cleaned out the bowl of his pipe. He was using the scraper I gave him on his last birthday, and it looked like he was trying to break the scraper. I got a mixed message feeling.

He blew through the pipe a few times, then began packing it. He said, “Bandwidth again.” like it was my fault.

Bandwidth is Netto’s most elusive prey. And the people who make a living pointing their fingers – you know the type - didn’t let him forget it.

“Yeah, Bandwidth. The new ghost in the machine.”

The computers were back online, and Netto turned to his screen. “The Press Secretary just issued a statement. ‘The Relationship Mainframe is a victim of a virus, and has been shut down. A government spokesman says there are no plans to re-activate the Mainframe until the source of the virus has been found.’”

I said, “Bandwidth doesn’t need it anymore. The scientists say the data in the Mainframe RAM chips has been totally erased. All gone. And the Mainframe data on the Satellite hard drives has also disappeared. Not deleted – disappeared. Wiped and overwritten.”

Netto lit his pipe. Just try telling him he can’t smoke in a public building. A sweet vanilla aroma wafted over.

“Totally gone from every computer they checked, but there are millions to check,” he said. “It does look like the centralized knowledge of the Mainframe has been eliminated. The Web of Recombinant Linked Data now exists where it did before the Mainframe Project - in a database spread out across the planet. That distributed database is now the Mainframe.”

I nodded. “I also heard that backup media is no help. The data is so heavily encrypted it is all gibberish. Any data exchanges the Satellites made with each other were apparently never decrypted. The data existed only in the hardware of the Satellites, and died when it was erased.”

“That’s what they are telling me. We might learn something from the backups if they ever break the encryption key, but no one is holding their breath. For all we know the Algorithm produced false backups anyway. Bandwidth doesn’t leave loose ends.”

“Never decrypting the data was a neat trick,” I said. “The Archipelago Algorithm encoded the data into a language only it could understand and just read it like we read English.”

Netto gave me one of his stares, maybe a 4 out of 10 intensity. I felt forgiven. He said, “So what was the point of this? Bandwidth likes to put on a show, but he’ll get minimal publicity over this. People reading their email had no idea their computers were building a parallel universe.”

I smiled. “I agree that it’s not his usual style. I think he changed up because this time the message isn’t simple. The media needs to sell their news bites in a few seconds or minutes, and you can’t explain this that fast. This time Bandwidth is looking at a different sales channel. Us. He got our attention by putting Top Secret data into the Mainframe. ”

“That part worked. So what exactly caused millions of computers to run amok? Did he really put a virus into the network?”

“Not the way I see it. He didn’t put in anything in that wasn’t already there. And the computers didn’t run amok – they just went independent. Ms Terry described it as living data – the data took on a life of its own.

“Look at the whole thing. The Mainframe is a repository for all the known data ever generated or perceived by the human race. Data is ideas, and ideas derive their meaning from other ideas. Put another way, ideas derive their meanings from their relationships with other ideas.”

Netto pointed his pipe stem at me. “Hence the name Relationship Mainframe. It was composed of every idea known to humanity, so it contained every relationship known to humanity.”

“Right. Now the Archipelago Algorithm is a program that finds relationships among all these ideas. Add to that fact the redundancy factor - the existence of the same ideas in multiple places in the database.”

Netto waited patiently. I gave him his chance and then I went on.

“The machines went independent because each one created its own Algorithm on its own hard drive. Then the Algorithm began executing. The Algorithm wasn’t put there like a virus. It was created anew on each Satellite.”

Netto’s eyes lit up a little.

“Explain.”

“Bandwidth’s message is that data and the laws of Logic are not separate entities – instead, they are expressions of each other. He revealed the mechanics of Consciousness to prove it. The Algorithm broke ideas into their component parts. Those parts were themselves ideas, uniquely identified ideas with their own existence and their own ability to combine with other ideas.

“Well, the Archipelago Algorithm itself is just a set of ideas. As the Algorithm on the Mainframe broke ideas into other ideas, it saved these new ideas on the Satellites. So the pool of ideas on any particular Satellite grew until the pool contained all the ideas contained in the Algorithm on the Mainframe. At that point it was a matter of time before those ideas joined together to form their own Archipelago Algorithm. The whole became greater than its parts and the data on the Satellites began examining itself. Boom. The birth of Consciousness.”

Netto’s chin came up a little. “Oh.” His chin sank down again, along with his eyes. “Oh.”

“Yeah.”

Netto narrowed his eyes, thinking it over. “Wait. How did the ideas composing the Algorithm link up? How did they find each other?”

“Bandwidth said the Algorithm does what it does because it does what it is. So whatever the process is, it is not external to the ideas. It is a function of how ideas are structured. He called ideas contextual atoms, so maybe he is hinting that ideas associate via a chemical process.”

“So he is saying that Logic is a chemical process?”

“The Message From Mentalos is that ideas – contextual atoms - are physical entities composed of energy and mass. So associations by chemical reactions, electro-magnetism, the fundamental forces - that’s where this seems to lead.”

Netto grunted. We were used to taking amazing things in stride when talking about Bandwidth. He said, “Sooner or later, Bandwidth will tell us.”

“In one way or another.”

There was a long comfortable silence. Netto did this thing where he leans back and closes his eyes while contentedly puffing away. I never knew if he was thinking or just shutting everything off.

Eventually I said “As the Algorithm found more and more relationships among ideas, it became more powerful. More ideas bred more relationships, and that influx acted as an accelerant that forced the Satellites to begin ‘talking’ to each other. They were just following the relationship trails started by the data the Mainframe was storing on their hard drives. That led them to the data on other Satellites. It was Logic ‘doing what it is’.”

Netto opened his eyes and took a deep breath. “Is that what Bandwidth meant by saying the data was alive? Data reaching out for more data?”

“Using his definitions it makes sense. If Consciousness is a set of instructions, those instructions may become more powerful as more ideas are added to the pool of ideas. Maybe the Algorithm is designed to add more ideas – more instructions – to itself as more ideas become available. He might be saying that there are levels of Consciousness. Maybe there are Algorithms examining other Algorithms.”

“Maybe he is also saying that Consciousness is a proof of life.” Netto chuckled to himself. “Speaking of levels of Consciousness, the people across the street are sore about losing the Mainframe. There will be another investigation. Maybe this time Petty will just shoot you and be done with it.”

Congressman Petty has chaired two House inquiries into Bandwidth. I was the star witness both times. At the first investigation he merely called me a liar behind my back. But he opened the second investigation with “Mr. Levels, just how long do you expect this Committee to listen to these preposterous stories?”

I moved along and said, “My guess is there is no chance of isolating the individual ideas needed to create an Archipelago Algorithm.”

Netto grunted. “As you describe it, the ideas are still here. He left the knowledge of the Algorithms existence. But we need to figure out what’s in it.”

After a while Netto asked “You said you think Bandwidth designed this fiasco not for the public, but for us. Who is us?’’

I re-thought it, then shrugged my shoulders. “Us.”

Netto blew circles in the air, well-formed, large. After a while he said, “The Satellite computers have human names. See where that is leading?”

I nodded. You can see the Lincoln Memorial from Netto’s window, and I took a long look. That mixed message feeling crept up on me again.

THE END