

Prologue

LATE IN THE afternoon of a gray day in December, a panel truck pulled up to the gate of a warehouse complex in a run-down section of Richmond, Virginia. Rolling down his window, Jack Davis punched a code into the control box, and the gate clanked slowly out of the way. Once inside, he wheeled the truck around and backed it up against a loading dock as the gate closed behind him.

After unlocking and raising the loading dock door, Davis threw a light switch, revealing long rows of pallets, each stacked eight feet high with boxes of paper plates, cups and towels. He closed and locked the door, and stamped on the brake release pedal of a hydraulic lifter parked against the wall. Counting to himself, he pushed the lifter along the wall of pallets. When he reached row nineteen, he turned the lifter and maneuvered its long tines under the pallet. Raising it a few inches, he backed up until he could swing the pallet through 180 degrees. Then he pulled it behind him until it was back exactly where it had been before.

Davis had plenty of room to work, because where the pallet in the second row should have been, there was only a large metal plate set in the floor. Near the edge was a small hinged panel, which he unlocked with a key to expose a biometric security pad.

When Davis pressed his thumb against it, he heard a familiar click. Stepping back, he watched as the plate swung slowly upwards, followed

by the telescoping ends of a ladder extending up from a deep shaft barely illuminated in red light. Grasping the ladder firmly, Davis descended through twenty feet of reinforced concrete while the door overhead swung silently closed above him. At the bottom, he remembered to don a pair of sunglasses before opening an unlocked door.

As usual, even with this precaution the bright lights in the enormous room beyond nearly blinded him. But soon he could clearly see the endless rows of floor to ceiling metal racks crammed with identical gray boxes. Each box displayed a row of rhythmically blinking lights, and sprouted a bundle of brightly colored wires that ran down into conduits embedded in the floor.

The room hummed purposefully with the sound of thousands of cooling fans, one to a box. Davis felt more than heard the other vibrations that filled the room, generated by the pulse of the thousands of gallons of cooling water that every minute coursed through the collectors lining the walls of the room, absorbing the waste heat that the racks of computer servers threw off. No heat signature would give this facility away from above; once warm, the coolant was directed to the water intake of a nearby power plant, happy to take the pre-heated water from wherever it was that it came from, no questions asked.

Walking along the perimeter of the room, Davis could look down through the open metal grid of the floor at the first of many additional tiers of computer servers. But that always made him a little dizzy, so instead he looked out for the guard he was relieving. No surprise – there he was, heading Davis's way, more than happy to call it a day. When they met, the guard stopped to slip on the coveralls he carried over one arm. Like the semi-automatic pistol the guard wore in a shoulder holster, they were identical to those that Davis also wore.

"What's the weather like?"

"Sucks. Sleet and more of the same predicted till morning."

"Figures. Tomorrow's my day off."

With that, the other man was on his way. In a few minutes he would drive off in the truck Davis had parked outside.

Well, the weather won't be bothering me in here, Davis thought. The room was climate controlled to within a tenth of a degree of a chilly 54 degrees Fahrenheit, and well-insulated by the bomb-proof walls and roof installed above. It had taken two years for a fleet of delivery vans to carry all the dirt and rock away that had been excavated from beneath the warehouse. The same vans had returned with cement, steel, and, eventually, those thousands of servers, accompanied by technicians to set them up. The process had been tedious, yes, but not a single satellite picture had ever shown a trace of the ambitious construction project proceeding underground.

THE ALEXANDRIA PROJECT

Of course, the effect worked in both directions. With no links to the outside world other than a voice line to his supervisor, the whole bloody world could come to an end and Davis would be none the wiser until after his shift was over.

Davis walked up a flight of steel stairs to the bullet proof, glass-walled security booth attached to the wall overlooking the room. His major challenge for the next twelve hours would be to stand watch in that booth without falling asleep. There'd be hell to pay if he did, because another guard, in another security room far away, would be watching him on a video screen.

The row of displays in front of Davis allowed him to see every inch of the outside of the warehouse complex. Racked on the wall behind him were a high powered rifle and a shotgun, but it wasn't likely he'd ever need to use them. One flip of the large red switch in front of Davis would flood the server room with enough Halon gas to not only put out a fire, but asphyxiate any intruder careless enough to leave a gas mask at home. Not for the first time, Davis wished that the house where he lived with his wife and their two small children could be as well protected.

But the government didn't put as high a priority on protecting suburban starter homes as it did on safeguarding its most critical computer network facilities. Some storage facilities, like those serving the needs of the Pentagon and the National Security Administration, were located not far away at Fort Meade. Others, like this one, were scattered far and wide, hidden in plain sight but highly secure nonetheless. No way was anyone going to crack this nut. Davis was dead certain of that.

If Davis had been able to electronically monitor what was happening on server A-VI/147 on Level Three, though, his confidence might have taken a hit. True, concrete and steel walls, surveillance cameras and Halon gas were more than adequate to protect the physical well-being of his facility against anything short of a direct hit by a "bunker busting" nuclear weapon. But the data on the facility's servers had to rely on virtual defenses - firewalls, security routines and intrusion scanners.

And those defenses hadn't been enough. Someone had gotten inside.

Meet Frank

THE NEXT MORNING, a morbidly obese Corgi named Lily was sniffing a tree on 16th Street, in the Columbia Heights neighborhood of Washington, D.C. A cold, insistent drizzle fell on her, but Lily didn't care, because Lily was sniffing at her favorite tree. Indeed, the meager processing power of Lily's brain was wholly consumed by sampling the mysterious scents wafting up from the damp earth, for this was also the favorite tree of every other dog in the neighborhood.

Something was nagging at the edge of her senses, though.

"C'mon, Lily! Hurry up!"

Lily turned her head. The annoying distraction was coming from the person at the other end of her leash, someone with sockless feet jammed into worn, black loafers. Above bare ankles, a pair of pajama-clad legs disappeared into a rumpled raincoat. She saw there was an arm holding an umbrella, too, and under the umbrella, a stubbly, forty-something face topped by thinning black hair. Lily decided that the face did not look happy.

"Ah!" she thought. "That would be Frank." Relieved that the distraction could be ignored, Lily returned to the important work at hand.

"C'mon, Lily!" the voice said again.

The fact that Frank's face was unhappy was unremarkable. Even in pleasant weather, Frank tended to dwell pointlessly over the minor miseries of his life. Not long ago, those miseries had become much less minor when his mother Doreen entered a retirement home. After helping her move in, Frank took a deep breath and prepared to leave. No use dragging things out, he thought. Transitions are difficult and best dealt with quickly.

Still, it was sad. His mother was standing by the doorway of her new apartment, lower lip a-tremble and Lily held tightly in her arms. It was clear that she was rapidly nearing her emotional limits. Better hurry up.

"Well, Mom," he said, "I guess I'll be leaving now."

Then it happened. With a lunge, Doreen thrust Lily into Frank's arms. He stepped back with surprise into the hallway, too horrified to allow himself to grasp the obvious, while struggling to maintain his grip on the suddenly manic animal.

"The home doesn't allow pets," his mother blurted. "I could never have signed the lease if I hadn't known that Lily would be safe with you. Now don't you worry; I've made you her legal guardian, so it's all set. Now go! Get out of here, before I change my mind."

Frank desperately wanted her to change her mind. But his mother had already shut the door in his astonished face. He stared blankly at it as the enormity of his plight sank in. Now what? Lily was just three years old, and acknowledged his existence only by barking. He heard his mother sobbing piteously on the other side of the door. He felt like crying, too.

That had been two long, loud months ago. Only recently had he progressed from the denial stage to active mourning.

"Come on!" Frank hissed. At last, Lily turned away from her tree. She looked up at him reproachfully, and barked.

"Okay, okay," Frank said, fumbling in his pocket. He held a dog treat up for Lily to see. "Okay?"

Satisfied that her efforts would not go unrewarded, Lily began looking for just the right place to do what finally needed to be done. At last, she squatted, looking blankly ahead. Frank sighed with relief.

A blue plastic bag inverted over his free hand, Frank scooped up Lily's grudging gift. He handed over the treat, jerking back with his fingers barely intact.

"Isn't that just the story of my life?" he thought bleakly as Lily happily consumed her treat. "Every day I give her a cookie, and every day she gives me a bag of shit."

Trudging home through the rain, Frank reflected that his day generally went downhill from there.

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Lily shook herself mightily inside the foyer of Frank's dingy apartment house, wetting what little of Frank that was still dry. Satisfied, she planted her substantial hindquarters firmly on the floor, looked up at Frank, and barked. Frank sighed, picked up the still-wet dog, and labored his way up the stairs to his second floor flat.

As he climbed to the top, Frank's rising eyes met a pair of fuzzy pink slippers, a floral house dress, and then a pair of folded arms draped with a bath towel. Just above them, he knew, would be the perpetually hostile face of his across-the-hall neighbor. As that scowling face hove into view, Frank once again noted the uncanny resemblance his neighbor bore to North Korean president Jong Kim-Lo. Only with hair curlers.

"Morning, Mrs. Foomjoy," Frank offered as Lily twisted wildly in his arms. He deposited the dog at her feet.

"Shame on you!" Mrs. Foomjoy barked as she knelt to massage Lily with the bath towel. "Poor, dear wet baby!" she crooned.

"It's raining, Mrs. Foomjoy," Frank observed. "Lily hasn't learned how to use the indoor facilities yet."

"Then why she not wear the lovely rain jacket I give her?" she snorted. "What is *wrong* with you? You don't deserve dog like this!"

Frank couldn't have agreed more. Lily groveled at Mrs. Foomjoy's feet, and then leaned to one side until gravity obligingly rolled her onto her back. The dog gazed up with adoring, goggle eyes as Mrs. Foomjoy rubbed her stomach.

His neighbor grabbed the leash from Frank's hand when she stood up. "I see to welfare of this dog!" she snapped, shutting her door loudly behind her. Frank stood suddenly alone in the poorly lit hallway, a warm, blue plastic pendulum swinging slowly from side to side in his hand. Relieved, he entered his own apartment and quietly shut the door.

Frank hung his dripping raincoat on a hook in the linoleum floored hallway inside. At one time, his apartment's décor might have charitably been described as "Late-Twentieth-Century Divorced Middle-Aged Male." Now the most obvious theme was random clutter. He poured a cup of coffee and sat at the small table in the small kitchen. Before him the large screen of his laptop stared blankly back at him. With resignation, he turned the computer on.

Normally, the sound of a computer booting up would have struck him as cheerful; the imperceptibly soft whirl of the cooling fan spinning up to speed; the blinking, blue light that assured him that the device was powering up; the screen phosphorescing into life with a pearly glow. After all, information technology – IT – was not only his profession, but the primary foundation of his existence.

Email was Frank's preferred link to the outside world, providing a social firewall between him and the random messiness of direct human contact. Frank was convinced that digital relations were far safer than their in-person analogue. Electronic communications brought him as close to his fellow man as he usually wished to be. Any more intimate than that, and things were apt to become at best unpredictable, and at worst, well, he'd been *there* all too often before. You never got enough time to think before things started spiraling out of control.

Which brought him back to the night before. Be honest, he mused ruefully. You got what you deserved. Or didn't get what you didn't deserve, to be more precise.

He stared at the keyboard. Should he check his email or shouldn't he? The rational side of his brain said, yes, what's there is there. Deal with it.

But the other side of his brain had a different opinion: "Go back to bed," it whispered urgently, "It's Sunday. You don't have to deal with anything today."

That was true. And who knows what might happen by Monday? There could be a typhoon tonight. Or maybe giant pterodactyls would erupt from a wormhole next to the Lincoln Memorial, scattering screaming tourists towards the safety of nearby Metro stations. That side of his brain was lobbying strongly to take two aspirin, pull the covers back over his head, and let reality take care of itself for another twenty-four hours.

He sighed and made up his mind. Might as well see sooner rather than later what people from his office had posted on line about the night before. A few clicks later and he was at the Facebook page of Mary, the sullen receptionist. Yes, there were pictures from the party. Lots of them. Later would do just fine after all, he decided. He snapped the laptop shut without turning it off.

The sad thing was, for once he had actually been looking forward to the Library of Congress IT Department Holiday party, even bringing his daughter Marla with him, a Georgetown University grad student. He appreciated the great impression she always made on his co-workers. Unlike her dad, Marla was self-assured and sociable. She worked

the crowd like a pro, chatting and shaking hands, poised and laughing. How could he feel anything but proud? It was hard not to drink a bit more than usual as he watched her from the security of the bar in the rear of the function room.

More to the point, Frank had been looking forward to making Marla feel proud of her old man as well. Everyone knew that George Marchand, the Director of IT at the LoC, was going to announce his choice to head an important security initiative mandated by the Cybersecurity Subcommittee of the House Committee on Science and Technology. Frank figured he had the spot all sewn up. After all, he was - or at least at one time had been - a recognized cybersecurity innovator; a McArthur Foundation "Genius" Award recipient, no less, in recognition of his widely acclaimed creative work in the early days of computer networking.

So when George stood up and tapped on his glass, Frank sat up straighter. He listened impatiently as his boss welcomed the spouses, thanked the staff for their work that year, and told a joke at his own expense. At last, he began to make the announcement that Frank was waiting for.

And then it happened. One moment Frank was looking sideways to see the reaction on his daughter's face when his name was called, and the next he was hearing someone else's name ring out instead. And not just any name, but Rick Wellesley's - "only out for himself" Rick, a self-satisfied slug of a middle-manager who had never had a creative thought in his life. Someone who had even briefly reported to Frank when he first came to work at the LoC. *Rick Wellesley?* How could this be happening?

But it was. There was Rick, standing and basking in the applause, glancing briefly and triumphantly in Frank's direction. Frank was stunned, his face burning. And then he was angry. Without a word to his daughter, he stood up and marched to the bar, turning his back on the party as George finished his remarks. Knocking back another drink, Frank now felt foolish as well as angry. Everyone was probably looking at him, but he was afraid to turn around and find out. He sulked at the bar until Marla came looking for him.

Sitting now in his kitchen, Frank felt his face grow flush again. After all, everyone had expected the job to go to him. Then, with a wrenching feeling, he had a worse thought - what if no one had expected him to get the job? Maybe he was the only one in the whole damn department who hadn't seen it coming. Maybe everyone had been laughing up their sleeves as they watched him bask in his expected glory, just

waiting for his jaw to drop when he realized that he had been skunked by Rick.

Of course that had been the case, he thought wretchedly. He was sure of it.

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And why not? What had he really done in the last twenty years? Sure, he'd become a star at the Massachusetts Institute of Technology – “MIT” to anyone in the know. He'd enrolled at the age of sixteen after skipping two years of middle school. Not that skipping a few grades was unusual at MIT. As an undergraduate, he'd become part of Project Athena, an ambitious effort to create a distributed computing system for the whole university. Of course, the goal for the project's corporate sponsors was to use MIT as a testbed. Later, they hoped to productize the design and make a ton of money.

For some reason, Frank had intuitively locked onto the security challenges that such a system would present. He already had privileges to use MIT's gateway to the government-funded Advanced Research Projects Agency Network – the now-famous “ARPANET” that was the precursor to the Internet. Only select institutions had access to it then, but Frank immediately grasped where Project Athena and the ARPANET together could eventually lead. It hit him between the eyes that this was the start of something big. Linking terminals together around a campus was today's goal, but the next step would be to connect those networks together, using ARPANET technology.

That sounded awesome, but how would you restrict access to any particular data to one person, and not let it be seen by everyone else? MIT was already a hotbed of hackers. If students were going to great lengths now to break into restricted sections of university computers just for fun, what would criminals, or enemy countries, not do to break into classified computers, once someone had linked them all together?

Frank tackled that issue with gusto, if not discipline. He was a big picture guy, and what a big and exciting picture it was! The idea of wide area networks was brand new, and big ideas were needed to make sense of it all; the details could come later. When Frank graduated, he stayed on at MIT, nominally in a PhD program, but for all practical purposes he lived at a terminal in the Project Athena lab, surviving on coffee and code like so many other young computer engineering students back in the day.

Luckily for Frank, he found a mentor – an engineer on loan from one of the sponsoring companies. Surprisingly, the two hit it off, and the older man reined in the younger one enough to keep Frank’s ideas from flying off into too many directions at once. He also insisted that Frank get his best ideas recorded in some sort of coherent order. Often they talked until all hours, the older man channeling Frank’s enthusiasm and helping him follow his insights down the most productive paths.

Frank never completed his doctorate, but he did finish his Masters thesis – and by anyone’s account, it was brilliant. He anticipated just about every security challenge that would arise over the next twenty years as the Internet took off. He also suggested most of the solutions that were later refined and implemented to deal with a massively networked world. Even today, his thesis remained an obligatory foundational reference in just about every new network and Internet security paper that was written.

Frank’s thesis also brought him to the notice of the mysterious keepers of the MacArthur Fellows Program – the unknown judges that every year contact a select group of exceptional individuals they have decided, “show exceptional merit and promise for continued and enhanced creative work.”

Receiving a MacArthur Fellowship had been the high point of Frank’s professional career. But as a practical matter, it also brought an end to it, because the payments of \$25,000 every three months for five years gave him the freedom to do whatever he wanted to without ever having to acquire the discipline of making his way in the world. It also allowed him to get married.

It was not helpful that what Frank wanted to do usually changed every other week. It wasn’t long before his work at Project Athena suffered. He no longer listened to his mentor, and his assigned tasks no longer got done. Instead, he plunged from one question that intrigued him to another, never getting very far along with any of them.

Like many people whose intellectual abilities matured before their social skills, Frank developed an abrupt and assertive manner that helped mask his discomfort around others. That was unfortunate, because his new-found fame encouraged him to become even more obnoxious than ever. Soon, the other guys in the lab were annoyed with his failure to meet his commitments, and also sick of hearing his latest revelations about security – or about any other topic on which he had decided he was now an expert.

Eventually, it was his mentor who took Frank aside and told him that if he didn’t shape up, his days in the lab were numbered. Frank

didn't take that well. What right did some middle aged, middle-management type with a degree from a state school in the Midwest have to tell a certified Genius anything about anything?

Quite a lot, Frank now reflected, gazing at his closed laptop. Like the immature idiot he was then, he had cleared his things out of the Project Athena lab the same day his mentor had called him out and never returned. Eventually, the MacArthur Fellowship money ran out, and with a wife and young daughter, Frank had to get more serious about working. Or at least he should have. For a while, his thesis and MacArthur reputation carried him from job to job. But when the bottom fell out of the economy, employers received a flood of great résumés for every job they posted.

By then, of course, Frank's résumé was also getting pretty long in the tooth. Frank had no "continued and enhanced creative work" to show for his five years of subsidized, random behavior. He'd never published another paper, and it was others, and not Frank, who turned his thesis ideas into real protocols and products. As the jobs got scarce, reference checks counted a whole lot more, and the feedback about Frank always came back the same: brilliant, arrogant, unfocused, unreliable. That was more charitable than what his soon-to-be ex-wife had to say. But he hadn't listened to her, either.

Frank usually tried not to think much about the years that followed: the start-up that had signed him up as Chief Technical Officer and the VCs that fired him; the time spent without a job at all; the rut he fell into for years after his wife moved out with their daughter, when he said the hell with everything and everybody. That time was a blur of punching the clock in whatever high school, small business or municipal IT department would take him on until he got fired again, then waiting until his unemployment ran out before finding something else he could do in his sleep, until even that became too much to bother with.

Through all that time, though, industry insiders still sought Frank out, so he maintained a low-key consulting business on the side to make sure he could always cover his child support payments. Among the elite in the world of security, Frank still had the reputation of a wizard, able to come up with the kind of insights that would make the most impenetrable problems suddenly transparent. An emailed plea for help describing something dense and dark that had already defied all of the usual solutions would reliably generate a response from Frank an hour or two later, usually beginning, "It strikes me that..." and ending with, "I suggest you try...." Invariably, what Frank suggested worked. But requests for his ongoing assistance went unanswered.

It was his daughter Marla that finally set Frank back on his feet. One Friday when he was once again out of work, he picked her up for their weekend together. But something was wrong; his normally chatty pre-teen wasn't saying a word. As they walked, she looked down at her feet. Then she looked up as if to ask him a question, only to look down again. After a while, Frank got irritated. "Marla, if there's something you want to ask me, just ask it already!"

But Marla still paused. Finally she said, "Dad, you know I'm in a computer class now, don't you? It's something you have to take in seventh grade."

"Yes," he said, surprised. "So?"

"Well," she said, and stopped. He waited, now curious.

"Well," she started again, "Today we went on a field trip to the computer department of a big company, and we all had to sign in and wear these name tag things. One of the people that worked there gave us a tour, and when she saw my name, she asked if I had a father named Frank, so of course I said yes."

"Uh huh," said Frank, not liking where this was going.

"Well..." Marla paused again, and then the words came rushing out. "She said that she went to school with you and you were the most brilliant person she had ever known and that you'd gotten a big award for being a genius and she wanted to know what you were doing now." Marla stopped abruptly for a long moment. "And I didn't know what to say."

Frank wished this could be all over, and quickly.

But, Marla, of course, needed an answer. "Dad, the guide said you used to be somebody really important."

Frank felt like he was dangling at the end of a rope, turning slowly in the breeze. He looked away, and tried to think what to say. What *could* he say? And then, with all of the disarming innocence of a child, Marla finished for him.

"Dad, she wasn't telling the truth, was she?"

Frank couldn't breathe. His daughter thought so little of him that she had to believe that the guide was thinking of someone else? Or was it that she would be too ashamed of what he had become to be able to deal with the truth? He felt sick.

By then, they were standing in front of the door of his cheap apartment building. The traffic rushed past the garbage cans and trash piled up on the curb, and Frank took it all in. The sights, the smells, his life – they all fit together perfectly, didn't they? Still, he couldn't think of a word to say.

Finally, Marla put her hand on his arm. “It’s okay, Dad,” she said softly. “Let’s go upstairs.”

That had been ten years ago. The following Monday he sucked it up and called his old mentor, George Marchand, and asked for a job. George was the head of the IT department at the Library of Congress now, and Frank called him out of the blue to ask if they could get together for coffee.

George had been as gracious as Frank had been uncomfortable. Frank had sent his résumé along by email, for what it was worth, and George cut straight to the chase after the opening pleasantries.

“You know I’ll need to bring you in at the bottom, Frank. Can you deal with that?”

Frank was prepared. “Sure, sure, George. I’ll be fine with that.”

George nodded, brows furrowed. Then he changed the topic. “How’s that cute goddaughter of mine these days? I can’t even remember the last time I saw Marla.”

“She’s great,” said Frank, suddenly determined; it helped to remember why he was sitting there. “Just great. We get together every weekend. She’s in seventh grade now. She’s smart as a whip and gets straight As.”

They chatted about family for a few more minutes, and then George looked at his watch. They both stood up, and shook hands.

“I won’t let you down,” Frank said as he looked George in the eye for the first time.

“I know you won’t,” his new boss said. But Frank could tell he was only being polite.

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Sitting in his kitchen, Frank reflected that he’d been as good as his word. But not much better, he made himself admit. Yes, he’d rarely missed a day of work, and no one could say he hadn’t earned his paycheck. And yes, he’d earned every promotion he’d been given.

But the promotions had been few, and the last one had been awarded seven years ago. Frank still had tremendous insights into IT architecture, and he remained as interested as ever in new developments in security. His cubicle at the LoC was stacked high with articles covered in scribbled notes, and he read voraciously online as well. For anyone in the office with a thorny problem, Frank was the go-to guy who could always solve it, provided he was allowed to tackle it alone. Sitting at a keyboard, Frank was still The Man – the tougher the

problem the better, just bring it on. Three hours, eight hours or twenty hours later, he'd still be turning it over in his mind until suddenly an elegant and creative solution would spring to mind.

Management level work, though, was something else again. Every time George gave him a shot at a long term project with a couple of others to supervise, Frank could never pull it all together.

Half the time, he'd be up in the clouds thinking big thoughts that went beyond the task at hand, and the rest of the time he'd be down in the weeds, diving down rat holes to solve problems that could easily be ignored. The folks he was supposed to be supervising never knew what they would be doing from one day to the next, or what, if anything, Frank did with the work they submitted. Inevitably, George would have to take the project back. It didn't take long before the big projects stopped coming, and Frank settled into the solitary niche where he had stayed ever since.

He wasn't done beating himself up, though. Admit it, he demanded, you were relieved when the projects stopped coming. You've been marking time for years now, and that's all you'll ever do. What right did you have to think George would throw this project your way?

But this had been a *security* project, damn it. That (and the drinks he'd had last night) were what had led him to corner George later on in the cloakroom.

"I'm sorry, Frank," George had said, wrapping his scarf around his neck. "I thought about letting you know ahead of time, and then I didn't. I guess I should have."

"That's not the point, George! Rick can't find his own ass with both hands in a well-lit room. What were you thinking?"

George buttoned his overcoat, and reached for his hat. "Of course Rick can't hold a candle to you when it comes to security, Frank. There's nobody I've ever worked with who has the insight and ideas that you do. And everybody knows nobody covers his butt like Rick."

Frank let his breath out with a rush of exasperation as George settled his hat on his head. "So then why did you pick him?"

George squared off to Frank as he pulled on his gloves, looking him straight in the eye.

"Frank, you may know security, but when it comes to understanding people and how to manage them, you haven't got a clue. Yes, Rick is one hell of a weasel. But you can always rely on a weasel to watch out for himself. That means that if you give him a job to do and tell him his job is on the line, well, by hook or by crook, he'll get it done. And I

can't say that about you."

Well, what could Frank say to that? He'd asked George for an explanation and now he'd have to listen to it.

"How many chances have I given you over the years, Frank? I can't remember, can you?" Frank looked away.

"You're twice as smart as I am," George continued. "You should have had my job by now! But that's never going to happen unless you grow up and learn how to perform. If you thought I'd stick my neck out for you with Chairman Steele grandstanding in the House, looking for the next poor bastard to eviscerate in front of the cameras during a public committee meeting, well, you're just delusional. Good night, Frank."

There hadn't been anything Frank could say to that, of course, so he was relieved when George turned and walked away. Furious at himself, Rick and George, in that order, he stalked back to the bar.

Frank decided that was as much of the night before as he was up to reliving; he'd leave the scene with Rick for his next exercise in psychological self-flagellation. It had all escalated so stereotypically anyway; Rick's approach and his smarmy condescension, Frank's insult in response. Okay, enough.

He felt the anger well up again, and with it, a sudden sense of purpose. Screw the jerk; just because Rick got the project didn't mean that Frank couldn't still show him up. After all, Frank had been so sure he had the spot in the bag that he'd already started writing up a proposal with his plan of attack outlined. No way was Rick going to be able to pull this job off; George would realize that soon enough, and then there'd be no one to turn to but Frank.

He snapped open his laptop and punched the keys with fury, rushing through the complicated log-in sequence that would take him into the heart of the LoC's system, where his proposal was archived. Highlighting the file name, he hit the Enter key, leaned back, and waited for the proposal to display.

Except it didn't. Frank leaned forward and poked the Enter key again. Still nothing. Perhaps his laptop was frozen. But no - he could still move his cursor.

Then Frank noticed that something on the screen was changing: the background color was warming up, turning reddish, orange and yellow, as if the sun was rising behind it. Now that was different! Frank watched with growing astonishment as the colors began to shimmer, and then coalesced into shapes that might be flames. Yes, flames indeed - but not like a holiday screen-saver image of a log fire - this was a real barn-burner of a conflagration!

Frank wondered what kind of weird virus he'd picked up, and

how. After all, he was an IT security specialist, and if any laptop was protected six ways to Sunday, it was his. So much for whatever he had planned for today; he'd have to wipe his disk and rebuild his system from the ground up.

He was about to shut the laptop down when he saw that the flames were dying away. Now what? An image seemed to be emerging from behind the flames as they subsided. Frank leaned forward; the image became a tall building - maybe some sort of lighthouse? Underneath, there was a line of text, but in characters he couldn't read. Truly, this was like no virus he'd ever seen or even heard of before. He reached for his cellphone and took a picture of the screen just before it suddenly went blank.

Frank was impressed. Whoever had come up with this hack certainly had a sense of style. A weird one, but hey, graphic art of any type wasn't the long suit of most hackers.

Frank got a pad of paper and a pen from his desk and punched up the file directory again, highlighted his proposal, and pressed the Enter key again. This time, he would watch more closely and take notes.

But all that displayed was a three word message: "File not found."

Frank tried again - no luck. He did a search of the entire directory using the title. Nothing. His proposal was gone.

Now he was alarmed. After all, the directory he was staring at was in the innermost sanctum of the Library of Congress computer system, and the LoC was the greatest library in the world. Within its vast holdings were books that could be found almost nowhere else on earth. Recently, the Library had begun digitizing materials, and then destroying the physical copies. If someone had been able to delete files in the most protected part of the Library's computer system, what else might be missing?

Frank raced through a random sampling of sensitive directories, and then let out a sigh of relief; it was hard to tell for sure, but everything seemed intact. He checked the server logs for the Library's indices, holdings and various other resources; everything appeared to be undisturbed, with no unusual reductions in the amount of data stored.

Frank drummed his fingers on the table in the cramped dinette. How to go about figuring this one out? Then he remembered his cellphone, and sent the picture of the screenshot to his laptop. The picture wasn't great, but once he enlarged it he could tell that the characters were Greek. He cropped the image until just the text remained, then ran it through a multi-script OCR program to turn the picture of the Greek characters into text. Finally, he pasted the text into a transla-

tor window. No luck – all he got was a “cannot translate” message.

Frank’s fingers started drumming again. He reopened the drop down menu of languages in the translator screen and noticed that another language option was “Ancient Greek.” He highlighted that choice and hit Enter. This time, the screen blinked.

Frank looked, and then he blinked, too. But the translation still read the same:

**THANK YOU FOR YOUR
CONTRIBUTION
TO THE ALEXANDRIA PROJECT**

~~-0000-0001-0010-0011-0100-0011-0010-0001-0000-~~

The Plot Thickens

FRANK WONDERED HOW long his phone had been buzzing. He was about to turn it off when he saw that it was Marla. “Hi, kid,” he said, “Listen....” But she cut him off.

“Well! So nice of you to pick up. I considered worrying about you for a second, and then figured you’d never really jump out the window – you’re only on the second floor, after all, and broken bones don’t solve anything. I mean, you’re much too logical to miss something like that.”

“Marla, I....”

“So how’s your big morning-after-the-night-before coming along?”

Frank tried one last time to escape. “Listen, Marla, this just isn’t a good time. I’m in the middle of something, and....”

“Right. Fat chance YOU got lucky last night. I’ll be right over.” She hung up.

Frank looked helplessly at the phone. He started to call her back but then put it down. She wouldn’t answer anyway.

Turning back to his laptop, he took stock. He had no doubt he’d eventually be able to figure out how the intruder had gained access. The more challenging question was why? All he really knew so far was that a file in the most secure part of a government computer system had been stolen by someone who wanted their theft to be discovered. That, and the fact that whoever was behind the exploit had a snarky sense of

humor, or wanted to lead him down the wrong path – or both. No matter how you looked at it, he didn't have a lot to work with.

Frank's fingers drummed on the kitchen table for a full minute, and then he opened the Alexandria Project screenshot again, this time using a photo editing program. But cleaning the image up as much as possible uncovered no new clues. More finger drumming produced no further revelation, either, so for want of anything more productive to do, he deleted the Greek text, typed in the English translation, and stared at the result.

How seriously should he take what had just happened? After all, someone with truly malicious intent would never leave a calling card. Instead, he would do everything he could to avoid detection. So if the cracker wanted his exploits to be known, what exactly was he trying to prove? Perhaps he was just showing off.

That would be troubling enough, though, given how deeply inside the LoC's defenses the intruder had penetrated. What if the files the mysterious cracker had decided should be "contributed" had been really important files? Or files that had just been created, and hadn't yet been backed up to another location?

On a hunch, Frank started typing again. A few new passwords and a number from a different security token than he'd used before, and he was staring at the same directory at the off-site backup center for the Library of Congress. Then he clicked on the Enter key for his security proposal. Nothing. And then the following message appeared:

*The material you have requested is being cataloged by the
Alexandria Project Acquisitions Department
Please try again later*

Frank was impressed; and he had to admit he liked the guy's sense of humor. Whoever had hacked the LoC's system was good – really good. He had not only penetrated the LoC's primary security system, but gotten through to the Library's backup site as well, ensuring that whatever had been "contributed" was gone for good. That was truly disturbing. If the intruder could do that with one file, theoretically he could do it with every file on every server available from his point of entry. Frank would have to put some real effort into working this one out.

And then it struck him: why bother?

He smiled slowly and leaned back. All of the tension that had built up inside him began to seep away as he laced his fingers behind his head and stretched his legs out under the table. This was actually rather cool, wasn't it? No, he corrected himself, this was really, *really* cool.

Up until that moment, Frank had been dreading checking his email. Now he opened it with relish.

Yes, there was an email from George waiting for him. Frank grinned wickedly as he read the subject line – in all caps, even: “WHAT IS THE ALEXANDRIA PROJECT?”

“Great question!” Frank banged out happily in reply. “Better get Rick on that right away!” He hit the “send” button with a flourish, staring gleefully at the screen as the message disappeared.

Frank poured himself another cup of coffee and toggled back to the screen with the Alexandria Project logo in translation. He saw it now with a new sense of appreciation. It actually was an awfully good looking image, wasn't it? Very stylish - just right to replace his old screen saver. Amazing how quickly a day could take a turn for the better.

Just then he heard a knock, followed by Marla's key rattling in the door. He got up to usher her in.

“Hey, kid!” he greeted her, smiling broadly. “It's great to see you.”

“My, you sound perky,” she said, looking at him with curiosity. “I thought after last night's little passion play I'd find you huddled in the corner in a fetal position, moaning softly.”

She walked into the kitchen to drop a bag of bagels and fruit on the dinette table, and then went back into the hall to hang up her coat. Returning, she found her father standing behind his laptop with arms crossed and a goofy grin spread across his face.

“So what gives? You haven't looked this happy since Rush Limbaugh got busted for popping pain pills.”

Frank just smiled and pointed at his laptop. Marla's expression was quizzical, but she wasn't about to ask for an explanation if her father hadn't chosen to offer one. She sat down and stared at the screen, searching for clues.

“Okay,” She said. “So you've found a new charity you like and that makes you all giggly?” But Frank just raised his eyebrows, so she looked at the screen again, vexed that her father had posed a riddle she couldn't solve.

Finally, she had to give up. “Alright, whoever you are, what have you done with my cranky old man? I'm not saying this isn't a huge improvement, but unless you agree to keep him, you might as well let him go now.”

Frank traded his grin for a simple smile and sat down. "Sorry to be so mysterious," he said, pouring her a cup of coffee. "But it's not every day I get to savor something this delicious. And this really is good."

"Fine," she said. "So share."

"Okay, so here's what's up: you've certainly figured out by now that I expected to get the project that George gave to Rick last night. And you've also assumed, I'm sure, that it was a security project, or my nose wouldn't have been so far out of joint." Marla shrugged. Of course, but she didn't want to embarrass her father further by admitting it.

"If so, you're right on target. Now here are two things you don't know: first, the project is an important one: the boys up on the Hill suddenly have their knickers all in a twist about cybersecurity. And it's a damn good thing they do, too, because there are bad guys out the wazoo out there with plenty of reasons to want to stick it to us - North Koreans; Revolutionary Guards from Iran; the big boys in Al-Qaeda, wherever they're hiding out; lots and lots of criminals in Eastern Europe and Russia - who knows who else. And the easiest way to wreak havoc on the only remaining Super Power in the world is via an Internet connection."

"Isn't that a bit of an overstatement, Dad? I mean, with all the money we spend on defense, how could some rogue nation, much less a criminal outfit, manage that?"

"How? Because we haven't done enough to prevent it. It wasn't until last June that the Department of Defense formally acknowledged that cybersecurity needs to be part of national defense at all. That's pretty scary, because if you think about it, our \$600 billion annual defense budget makes us more vulnerable, not less so."

"How do you figure that?"

"Because it helps us run everything with computers - all the bombers, all the missiles, all the ground troops - everything. And they're all controlled through the Internet."

"So what? Isn't that why they hire smart guys like you, to set things up so the bad guys can't get in?"

"Sure, the government sets up firewalls and requires people to use passwords and all that, but data still has to get in and out or it isn't useful. The CIA bigwigs at Langley have to suck information in from resources all over the world, and they also have to get instructions back out to their agents in the field. Same with the Department of Defense. All that data is spewing in and out like a giant fire hose - video from predator drones flying over Afghanistan, satellite data from all

over the world, battlefield intelligence from spotters in forward positions, and much, much more – gigabytes of it every hour.”

Marla looked unconvinced. “Okay, so why is this any different from the old days, when all they had were secure telephones and secret codes for anything that went out by radio? It may be more information now, but aren’t the challenges just the same?”

“Yes and no,” he admitted, “but the ‘yes’ bit is by far the smallest part. The first thing to realize is that in the old days, besides paper documents, all you had to worry about were voices and Morse code signals. Both were transmitted using ‘analog’ technology – electric and electromagnetic pulses. If a bad guy managed to intercept the message, the most he could do was listen and record it to play back later. These days, we send every kind of information imaginable – everything from text to spreadsheets to video to radar images to...you name it. And all that information is transmitted as ‘digital’ data – just ones and zeroes. Those ones and zeroes can be stored, analyzed, searched, repurposed – and altered in ways that a voice recording never could.”

“So?” Marla asked. “That should just make things a whole lot easier to deal with, shouldn’t it? I mean, computers can just encrypt all that information automatically, right? In the old days, I guess the sender had to use code tables and such to encrypt messages one word at a time, and then the receiver would have to do the same thing in reverse. And if someone broke the code and you didn’t know it, you were cooked. I remember you telling me how the Brits cracked the Nazi’s Enigma machine code and the Germans never figured it out.”

“All that’s true,” Frank said, “but there are some important differences. Back when most information existed only in paper form, it was easy to control how many copies of a top secret document there were, and who had access to them. And you could put them behind walls, locks and guards. Now they’re all on servers, and those servers are all linked together, and....”

“Okay, Okay,” Marla interrupted. “You’ve ranted at me about this often enough before.”

“Hardly ranting,” he said primly. “Simply fulfilling a father’s duty to pass along important information to the next generation.” She made a face at him. “But to continue: every day, every big enterprise is adding new computers for new employees; swapping out old routers as part of normal maintenance; updating obsolete software and adding new programs. All of that has to be done according to strict protocols, or it introduces points of vulnerability. And when you allow email into your system, bad stuff can come in that way, too – lots of it.”

“Okay,” Marla admitted. “I’ve fallen for that stuff once or twice.” But her interruption barely slowed him down.

“Every moment, the bad guys are probing our systems for gaps in our defenses. It only takes one vulnerability to allow an intruder to plant some nasty software – ‘malware’ we call it – inside the firewall, and it’s usually really difficult for us to find it. Once it’s there, the malware can start prowling around. When it finds what the cracker sent it to look for, it opens a “trapdoor” in the firewall and sends that data to whoever planted it in the first place. Or maybe it’s been programmed to delete the information so it’s no longer available, or perhaps subtly alter it in such a way that while it may seem fine, it’s actually no longer trustworthy.”

“It all depends on who the bad guy is – a criminal, a spy, or whatever. Imagine he works for, say, Al-Qaeda. The malware he plants just sits there, like a living member of a sleeper cell, just waiting for the right time. You don’t know it’s there, but it is. One day its clock runs out, or it gets a signal from outside, or maybe it even gets triggered by something inside the firewall it’s been waiting for. Then it does something truly destructive, like take down a key system just when it’s needed the most – say the national power grid.”

Marla broke in. “Okay, okay, I’m impressed. But if this is so dangerous, why don’t we hear more about it?”

“But you have, my dear,” he replied. “Do any of these names ring a bell? Heartland? ~~Target~~ Hannaford Brothers?”

“I remember hearing the name Heartland before. Wasn’t that the big credit card security breach that was in the news a while back?” Her father nodded. “So I’m guessing the other two were security breaches, too, right?”

“Bingo.” Frank nodded again. “In the biggest breaches, ones like those, the credit and debit card information of millions of people gets compromised, and often even by the same guy, a cracker named Albert Gonzalez.” Frank pulled Gonzalez’s mug shot up on his computer as he spoke and then swiveled his laptop towards her. “There – that’s the guy.”

“Hmm. Not a bad looking hacker,” Marla observed appreciatively, watching her father out of the corner of her eye.

“Cracker!” Frank corrected her. “*Crackers* wear black hats. *Hackers* aren’t criminals. Your father is a hacker. But if you insist, I’ll call the bad guys ‘hackers,’ too.”

“Whatever,” Marla responded emphatically. “Are we getting any closer to the point here?”

“Yes,” Frank replied tartly. “And I doubt Gonzalez will look like that by the time he gets out of Federal prison. Anyway, in the data breach you remember, Gonzalez succeeded in planting a virus called a ‘sniffer’ inside the firewall of an information processing company that sits between the merchants that take in credit card information and the financial institutions that complete the card transactions.”

“What a sniffer program does is look for information, and when it finds what it wants, it sends it back to the hacker. All it took was one employee adding a wireless router to the system and forgetting to set the security settings up properly. Probably in no time flat, the automated software Gonzalez was using found the vulnerability, and in went the sniffer. It was two years – and forty million pirated customer records - before Heartland realized it was broadcasting sensitive personal financial data to criminals.”

“Okay, so a company goofed up,” Marla objected. “I would certainly expect our government to be much more careful.”

Her father raised his eyebrows, and Marla paused. “Or maybe not,” she admitted.

Frank smiled smugly. “Unfortunately, the federal government is a lot like the credit and debit card system – it’s got thousands of locations with computers, countless types of hardware and software products in use (and changing) at any time, and millions of people who might be a little bit lazy or not well enough trained. So every government agency has thousands of points of potential vulnerability. All it takes is one careless moment by one individual, and this time it could be the Department of Defense, or the CIA, or the White House that gets the sniffer – or something more dangerous.”

“And it’s worse than that,” Frank continued, pulling up an article on his laptop from the *New York Times*, describing a recent top brass meeting on how capable the U.S. might be if it had to respond to a cyber attack.

Marla scanned the assessment, reading how the attacker would have all the advantages – no one would be able to pinpoint the country of origin, and it might not even be justifiable under international law for the victim to respond militarily.

“So I’m getting the ‘not good’ part here loud and clear,” Marla acknowledged. “But what does that have to do with you and Rick and the LoC? And what especially does it have to do with that crazy message on your laptop, by the way? Remember your laptop? I believe it’s what I saw on your laptop we were actually talking about.”

“I’ll get to that in just a minute,” Frank responded.

Marla groaned and put her head on the table.

Frank made a face this time. "Alright. I'll move on. But just keep this part in focus: for all our wealth and strength, right now any Third World country, or even a terrorist organization, could crash an entire agency – or, for that matter, Wall Street – if they put some smart guys to work on it."

"Fine. I'm appropriately terrified. Now Daddy, please make your little girl feel warm and secure again. You are going to make it all better now, aren't you?"

Frank smiled ruefully. "That's a tall order. But I will tell you what we're trying to do about it, or at least the non-classified details that make their way down to someone at my level."

"The new administration is much more aware of cybersecurity than the old one, thank goodness, and more creative, too. They decided to take a competitive approach to the problem, so they told every single agency and semi-independent department, like the LoC, that it has to come up with its own security plan – and fast. We've only got until February 28 to submit our security proposal to the White House."

"And that's a really good idea. The thought is that if we get fifty different teams competing, we'll come up with a lot more clever ideas than we would if we had just one design team. Even better, we should be able to use several different plans, rather than just one. That way the whole government won't be vulnerable to a single attack across the board, or be as likely to permit a successful exploit in one agency to infect another once it's inside the first one."

Marla interrupted. "And George thinks that Rick is going to be able to pull that off better than you?" She felt offended on her father's behalf.

Frank suddenly looked less cheerful. "Yes, and George may be right. This is one of those projects that requires getting a whole lot of people on the same page. It will take lots of meetings; lots of compromises; lots of cajoling. That's not exactly where I shine. Last night I could have punched George in the nose, but this morning I have to admit everybody else would probably want to punch me within a week if I was in charge."

Marla knew her father was probably right. "Still having trouble with that 'smartest guy in the room' problem, huh?"

"It's not only that," he replied wearily. "Yes, I'd be frustrated when some people couldn't keep up with me. But at the same time, I probably wouldn't focus very well on filling in all the less interesting bits that it takes to make the big picture clear, either. Plus, whoever is in charge

is going to have to spend a lot of time grinding away on administrative details, and I get too impatient.”

“Couldn’t you just get somebody else to do that part?”

“Sure, but there are other issues. Like balancing what’s perfect with what’s practical, so that overly strict security requirements don’t bring everything to a standstill, or require people to do more than you can actually get them to do. To come up with a really good solution, you need to take into account how people really act. Otherwise, they’ll just take short cuts that leave security gaps.”

“In short, doing something like this takes lots of things I just don’t have the patience for. Or for that matter, much talent.”

Marla gently changed the subject: “So what about this Alexandria Project thing?”

“Ah yes!” Frank brightened considerably. “It seems that my good friends George and Rick are going to have to face a challenge that’s a lot more than either of them bargained for.”

~~0000 0001 0010 0011 0100 0011 0010 0001 0000~~

THE ALEXANDRIA PROJECT