



THE
ROBERT
MORRIS
WORM





Shortly after 6pm on Wednesday, November 2nd 1988 a virus began infecting the nascent Internet. One by one, American colleges, research and military facilities crashed: The

Pentagon, Rand Corporation, MIT, Harvard, Berkeley, Lawrence Livermore Labs (one of the country's largest weapons labs), DARPA and NASA. The Army's Ballistic Research Laboratory thought the country was being invaded and shut down their systems.

For many people in 1988, a computer-infecting virus was something better suited to the pages of a science fiction novel than the front page of *The New York Times*. Those captivated by the story would soon learn that the virus was in fact a *worm* and as it began to corrode the very foundation of tech-America, its young creator would come to represent all that was exciting and dangerous in the Internet Age.

Before *The New York Times'* computer reporter JOHN MARKOFF could begin to investigate the worm that had struck overnight, his phone rang. It was a call from a young man who gave his name as Paul and claimed that the person who had written the worm was his brilliant friend, a "well-intentioned soul who had made a terrible mistake in the code." Paul went on to say he had made a small error that caused the worm to multiply uncontrollably around the Internet. By Friday, Markoff and Paul had spoken several times and Markoff had tried without success to call his NSA contact, BOB MORRIS, the Chief Scientist at the agency's *National Computer Security Centre*, with whom he often traded information. Later that day, Paul slipped up and accidentally referred to the author of the worm by his login *rtm*. Markoff quickly looked up the login *rtm* (there was a white pages of sorts for these logins) and found it belonged to a graduate student at Cornell.

Later that afternoon, Bob Morris called back and Markoff told him he believed a grad student named ROBERT TAPPAN MORRIS had written the worm. Markoff then, quite genuinely, thought aloud, "Isn't that a funny coincidence, you both have the same name." Without missing a beat Bob replied, "That's no coincidence. He's my son."

Bob Morris was a computer security expert like no other. A founding father of UNIX (a precursor to today's Windows or Mac operating systems) he'd made his way to the NSA via Harvard and Bell Labs where he earned himself a reputation as a brilliant scientist with a capacity for offbeat thinking and behavior. He was equally eccentric as a father and husband. The Morris family consisted of Bob and ANNE and their children Meredith, Robert and Ben. The family lived on a farm in rural Millington, New Jersey in a house dating back to 1740, where they lived an idyllic if somewhat idiosyncratic life that combined cutting edge technology and 18th century farming.

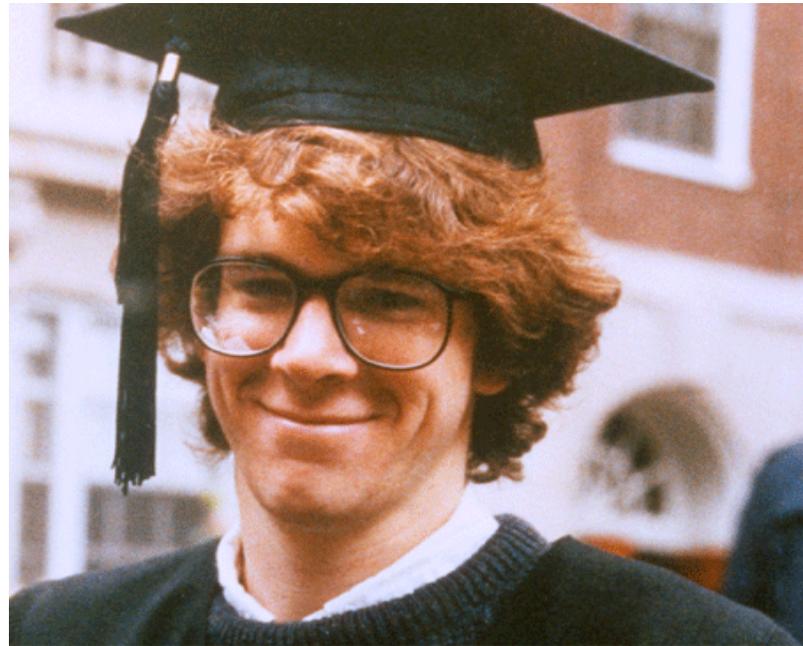


Bob spent his days as one of the world's leading computer experts, but by night he might teach himself ancient Greek, the oboe and cello, or build an exact replica of a 15th century sheep pen. This set the tone for a house of curiosity and learning where everyone was a scientist in their own way. Bob was also a rule breaker; he returned home one day with an original Enigma machine under his arm. He'd simply walked out the front doors of Fort Meade with it in a bag while chatting to the Deputy Director of the NSA. It sat in the living room next to a powerful technological descendent—a Bell Labs UNIX terminal. It's here that Bob's young son Robert would follow his father's rebellious cues and began to explore the earliest arenas social networking on the Internet.

At times there were up to twenty-five children of Bell Labs employees using their parents' home terminals, many of them never meeting in person. Robert became a regular, making many friends and exchanging homemade games. He soon graduated to reading the UNIX manuals and learning enough that he could match his father's intellect. At high school, Robert was using an Apple II computer, while at home he was building programs and writing papers on systems far more advanced than the Apple operating system. At fourteen Robert hacked into Bell Labs and began operating as a super user. In a precursor to later events, Bob asked Bell Labs to take away all the kid's accounts. When prodded on who the perpetrator was, Bob confessed it was his own son.

As a high school freshman, Robert became more of a colleague to his father. Oblivious to the rest of the family, they would have long theoretical discussions about the nascent Internet and its potential. As a sophomore, Robert took up a part time job at Bell Labs where he began working on finding a more secure way of copying files

between machines. The program he wrote was so good that it became the model Bell Labs eventually adopted. He graduated from The Delbarton School, earning them their highest SAT in history. At Harvard he continued to excel, working hard at the Aiken Computation Lab where his father had once studied. His crew at Harvard consisted of a tall red haired Olympic Rower, ANDY SUDDUTH; a linguist and science major, DAVID HENDLER; a law student, KAREN BEAUSEY; and PAUL GRAHAM, a hyperactive and pink cheeked computer science graduate.



By 1988, after 26 years at Bell Labs, Bob moved the family to Arnold, a small Maryland suburb where he headed up computer security for the NSA. Bob was proud of his son and during the spring break, he invited Robert to give a talk at the NSA on everything he knew about UNIX security. The following day he repeated the talk at the Naval Research Laboratory.

After Harvard, Robert pursued graduate studies at Cornell in August of 1988. While the Dean of Computer Studies welcomed the new students and explained the school's security policy, Robert had already logged in and mastered their system. At Cornell he quickly gained a reputation as a brilliant but quiet programmer, a go-to guy.

It's at this point that Robert began to seriously consider testing his theories. In his mind, his worm was a harmless exercise in probing the theoretical size and security of the Internet.

On a long weekend away with friends in October 1988, Robert revealed to Paul that he had found a flaw, a security hole that could be used to write a virus. Paul, who idolized Robert's genius, enthusiastically supported the idea. Had he been amongst some of his wiser friends, they may have suggested he simulate the worm on a closed network. But that wasn't the point – Robert wanted his worm to travel silently to the far reaches of the Internet.

A week later Robert launched the worm by remotely logging into a computer at the MIT Artificial Intelligence Lab. He then went to get some dinner but when he returned it had already replicated itself out of control and infected networks across the country. Robert knew he had fucked up. Big time.

Later that night Robert called Paul in a panic. He explained that he had accidentally programmed the virus incorrectly and it was now spreading across the country. What had meant to be a harmless and stealth experiment was now completely out of control. After discussing a possible antidote program, Robert decided to call his friend Andy and convinced him to send out an anonymous message to the Internet telling users how to fix their systems. This message was largely either ignored, not seen or didn't get through to crashed systems.

Meanwhile at Berkeley, the birthplace of UNIX, programmers were working frantically to keep their systems online. They soon figured out the worm was exploiting a subtle flaw or bug in a program called *sendmail*. They also realized that whomever had unleashed it had no intention of destroying data or stealing anything. One by one the Berkeley team began immunizing their systems and pulling the worm apart to analyze it.



Once inside a computer, Robert's worm propagated to other computers much like a biological one. Throughout the night it hopped back and forth, setting off havoc wherever it touched down. Many users couldn't even pick up the phone to call other colleagues. Even in its early stages of development, the Internet was already so relied upon and anonymity so pervasive that many people who communicated on it didn't even know the real name of who they were talking to, let alone have a phone number for them. One after the other, users began disconnecting. The Internet went down. Robert had broken it.

The following morning, as news of the virus spread around the country, Robert lay low at home. His mind was racing. He called his father from Cornell, who was perturbed but not angry. Bob and Anne sprung into action to protect their son. Robert had planned to go to Philadelphia that weekend with his friend Janet. Bob encouraged him to go, not to do anything out of the ordinary, and not to tell anyone where he was going.

While Robert planned to leave Cornell, his friend Paul anointed himself as unofficial spin-doctor and called Markoff at *The New York Times*. If he hadn't slipped up, Robert and his family could have had another couple of days to regroup before they were thrown into the media spotlight.

On Friday as Robert left for Philadelphia, his parents started looking for a lawyer to represent their son. They chose white-collar crime attorney Tom Guidoboni.

On Saturday FBI Special Agent Joe O'Brien picked up a copy of *The New York Times* and read the headline: "AUTHOR OF COMPUTER 'VIRUS' IS SON OF NSA EXPERT ON DATA SECURITY." O'Brien had moved to Ithaca, a stones throw from Cornell, from New York City in 1984 with specific orders to lay low after he had been central to taking down mafia boss

Paul Castellano. The last thing he wanted was a high profile case. At the time the FBI only had one computer crime expert and they didn't see the need for him to be involved, as it had been established that the virus was a breach but not a threat. So O'Brien was ordered to take the case and started looking into Robert Morris.

By Sunday, a giant crowd of television and newspaper reporters had surrounded the Morris house. Every news outlet in the country had picked up on the strange story of the remarkable family and their son's intellectual prank. Bob and Anne escaped the house and drove to Philly to collect Robert and visit their new attorney, Guidoboni, who wanted to talk to Robert. After hours of being grilled on every movement and aspect of the last few weeks, Robert collapsed in the car park from exhaustion. They drove home that night to



face the scrum of reporters surrounding their house. Meanwhile, FBI Agent O'Brien began collecting evidence and serving Morris' friends Paul and Andy with subpoenas and interviewing David and Karen.

Opinions of Robert's virus varied from mediocre and sloppy to brilliant and world changing. Similarly, the price tag on the damage was suggested as being as high as \$100m while others declared there had been no damage at all. However, everyone agreed that it had alerted the industry and the nation to security flaws on computer networks.



By Thanksgiving, Robert had withdrawn from Cornell and moved into his parent's house. His skills were still in demand and he got a job at a private international development agency, accompanying his mother to Washington on a three-hour daily commute.

In the spring of 1989 the case against Robert was given to prosecutors in Washington after Guidoboni was unsuccessful at avoiding trial. The Justice Department proceeded with an indictment on felony charges, using FBI Agent O'Brien's evidence and witnesses. The family waited for the trial in November of 1989. Robert immersed himself in work and study while Bob took up church bell ringing as a hobby.

His mother Anne began a fierce campaign to promote his son's case as an innocent young curious mind working within unregulated technology.

Two weeks before the trial, the Justice Department surprised the Morris family by revealing they had a tape of Robert's NSA lecture on UNIX security from 1988. When Guidoboni made it clear he intended to put Bob Morris on the stand and get to the bottom of who had signed off on the lecture, the Justice Department suddenly pulled the tape.

During the January 1990 trial both prosecution and the defense were at pains to find jurors who had no knowledge of computers (that was still possible in 1990). Mark Rasch, the Justice Department's star computer prosecutor, pronounced Robert's middle name "Tap-in" and fought hard to put Robert behind bars. But he had not considered the respect that Robert had garnered in his short career. The trial became a reunion for the computer security's power hitters who came from across the country to support him. In the end Guidoboni was able to convince the jury that Robert's crime did not warrant prison. He was sentenced to three years probation, a \$10,000 fine and 400 hours of community service, becoming the first person convicted under the new *Computer Fraud and Abuse Act*.

Robert went on to join the Department of Electrical Engineering and Computer Science at MIT where he received tenure in 2006 and co-founded the online store *Viaweb*, one of the first web-based applications, and later *Y Combinator* - both with old friend, Paul Graham.