Buildings house secret servers that keep the Internet running

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From the outside, the Gothic brick and limestone building a few blocks south of downtown almost looks abandoned.

Plaques identify it as a landmark completed in 1929, a former printing plant that once produced magazines, catalogs and phone books. The sign over the main door says "Chicago Manufacturing Division Plant 1."

There are hints, though, that something is going on inside. Cameras are aimed at the building's perimeter. A small sign at the back entrance says "Digital Realty Trust."

Sturdy gates across the driveway keep the uninvited out.

There's good reason for the intentional anonymity and security, says Rich Miller: "The Internet lives there."

Miller, editor of Data Center Knowledge, which tracks the industry, and Dave Caron, senior vice president of portfolio management for Digital Realty, which owns the 1.1 million-square-foot former R.R. Donnelley printing plant, say it is the world's largest repository for computer servers.

Caron won't identify its tenants, but he says the building stores data from financial firms and Internet and telecommunications companies. "The 'cloud' that you keep hearing about ... all ends up on servers in a data center somewhere," he says.

There are about 13,000 large data centers around the world, 7,000 of them in the United States, says Michelle Bailey, a vice president at IDC, a market research company that monitors the industry. Growth stalled during the recession, but her company estimates about $22 billion will be spent on new centers worldwide this year.

The need for data centers is increasing as demand for online space and connectivity explodes. Some are inside generic urban buildings or sprawling rural facilities. For all of them, security is paramount. Inside, after all, are the engines that keep smartphones smart, businesses connected and social networks humming.

Some data centers have "traps" that isolate intrusions by unauthorized individuals, technology that weighs people as they enter and sounds an alarm if their weight is different when they depart, bulletproof walls and blast-proof doors, Bailey says.

When Wal-Mart opened a data center in McDonald County, Mo., a few years ago, County Assessor Laura Pope says she signed a non-disclosure agreement promising "I wouldn't discuss anything I saw in there." She hasn't.

Borrowing a line from a 1999 movie, Miller says, "I used to kid about the 'Fight Club' rule: Rule No. 1 is you don't talk about the data centers, and Rule No. 2 is you do not talk about the data centers."

Although the rapid growth of data centers has diminished their ability to "hide in plain sight," he says, many owners and occupants are "very secretive and ... sensitive about the locations."

That makes sense, Miller says. "These facilities are critical to the financial system and the overall function of the Internet."

Some data centers - sometimes called carrier hotels because space is leased to multiple companies - are in large urban buildings where they can tap into intersecting networks, Miller says.

Old manufacturing facilities such as Chicago's Donnelley printing plant often are repurposed because they have high ceilings and load-bearing floors to support heavy racks of servers.

"They are interesting examples of the new economy rising up in the footprints of the old," he says.

Giant companies such as Google, Facebook, Apple, Yahoo and Amazon often build their data centers in rural areas. "They're looking for cheap power and cheap real estate," Miller says. While the number of private centers grows, the federal government is consolidating. It has more than 2,000 data centers and this summer announced plans to close 373 by the end of 2012.

Communities such as Quincy, Wash., population 6,750, and Catawba County in western North Carolina want to become data center hubs. Catawba and neighboring counties dubbed themselves "North Carolina's data center corridor," says Scott Millar, president of the Catawba County Economic Development Corp.

Apple last fall opened a 500,000-square-foot, $1 billion facility in Catawba County. Google and Facebook have data centers in nearby counties and more are under construction.

Catawba County is building a second data center park in hopes of attracting more, Miller says. Because data centers don't require many employees, most of the permanent jobs are created by contractors who provide electrical, cooling or security support, he says. About 400 people work at the giant Chicago data center; many employ far fewer.

The Apple data center, Miller says, is "pretty secretive." No signs indicate what the building holds, he says, "but everybody knows what it is."

James Lewis, a senior fellow in technology and security at the Center for Strategic and International Studies, a public policy research group in Washington, D.C., compares the evolution of data centers to changes in the way electricity is generated.

A century or more ago, he says, factories and other companies operated their own electric plants to power their lights, elevators and other functions. Those with spare capacity began to sell it to their neighbors. "That's what happened to computing," Lewis says.

Instead of maintaining computer servers in their own facilities for rapidly growing data storage needs, some businesses locate their servers or backup servers in data centers, he says. They can save money because the centers minimize energy consumption, ensure security and allow computers to share tasks. Data centers also give companies places to store backed-up data that is crucial to their businesses.

"The amount of data in the world doubles every couple of years and people ... are willing to pay for it to be stored," Lewis says.

He doesn't think it's essential to conceal the centers' locations, though, because hackers won't try to come in through the front door. "The main source of risk isn't physical, it's cyber," he says. "If hiding the location ... is all that they're doing, they're not doing enough."

Keeping a low profile is just the beginning of the security measures at Digital Realty Trust's massive Chicago data center.

The exterior is embellished with terra cotta shields depicting printers'

marks. The building occupies almost a full block, is nine stories tall and has a 14-story tower. Inside, there are visible and unseen protections, some of which the company won't talk about publicly. There are guards at both entrances, cameras inside and out, motion sensors and much more. To access the rooms where rows of servers live, a card must be scanned and a fingerprint recognized.

The interior of the building is a mix of old and new. Because it is a landmark, its wood-lined two-story library, which has been used for photo shoots, must be kept intact. Some corridors feature stone arches overhead, and some offices are paneled in English oak.

Other hallways are sterile and silent. Inside the locked doors of the individual data centers are locked metal-grid cages and, inside them, rows of black shelving with the blinking lights of servers visible through the doors. The only sound is an electronic buzz. Cameras scan every square foot of the room.

Between the rows of servers are "cooling aisles" with thousands of round holes in floor tiles feeding cool air into the space. Over the server shelving are ladder racks that suspend "raceways" - yellow plastic casing enclosing fiber optic cables. The shelving doesn't extend to the ceiling; air must circulate above the servers to keep temperatures down.

Caron says it costs $600 to $800 per square foot to build a data center and often less than $70 a square foot for a normal industrial building, including the land. The giant printing presses that once filled space in the former Donnelley building made it ideal for conversion to data center use, he says. A data center floor must be able to handle at least 150 pounds and as much as 400 pounds per square foot. By comparison, most office buildings are built for 70 pounds per square foot.

Huge amounts of electricity power all those servers, he says: 100 to 150

watts or more per square foot, compared with 3 to 5 watts for each square foot of an office building. To keep the servers running, there's more than one electrical feed into the building and backup systems and generators ensure there's never an interruption in power. The Chicago facility has 63 generators.

Digital Realty Trust, which bought the building in 2005, owns 96 properties, most of them data centers, in the U.S., Europe and Asia, Caron says. There is, he says, "a lot of demand" and the company expects to spend up to $500 million this year on acquisitions. Last year it spent more than $1 billion, he says.

Not every data center is a fortress. The one owned by the city of Altamonte Springs, Fla., is a former 770,000-gallon water tank next to City Hall.

Lawrence DiGioia, information services director in the city of 40,000, says he relocated the city's servers after being forced by three hurricanes to pack everything up to keep them out of harm's way. The tank has 8-inch-thick walls. "It did a great job holding water in," he says, "so we knew it could keep water out."

Even a small-scale data center needs security, though. DiGioia says his is protected by video surveillance, requires dual authentication to enter and a biometric lock limits access to the server room.

It's even harder to get into the five data centers 200 feet deep in a former limestone mine in Butler County, Pa.

"The facility affords a very high level of security, not only physical - armed guards, steel gates, layers of security, biometrics - but also we're protected from the elements, civil unrest, terrorist-type things," says Chuck Doughty, vice president of the Underground, as it's called, for

Iron Mountain, an information management company.

Except for the cars parked outside, he says, "you'd have no idea what's here." Besides 7 million gigabytes of digital data, including e-mail, computer backup files and digital medical images such as MRIs, the Underground is home to documents, film reels and computer backup tapes owned by the U.S. Patent and Trademark Office, Sony Music and Universal, among others.

Doughty worked for years on Room 48, an experiment in making data centers more energy-efficient and reliable, and is working now on ways to use some of the cold water in the mine to cool the computer space without using chillers or cooling towers. He hopes to begin construction next year.

The security of data centers, Doughty says, is becoming increasingly important for companies and governments "not only because of the situation in the United States with terrorism, but because of the world situation."

Lewis says one of the lessons of the Sept. 11 terrorist attacks was the importance of having data stored in more than one place. As more data centers are built, he says there will be more debate about legal issues: What happens if law enforcement has a warrant for a server that also contains data owned by other companies? Should there be standards for protecting consumers, including requirements that they be notified of breaches? Should data centers be regulated by the government?

John McKay, a visitor to Chicago from Vancouver, Canada, snapped photos of the former printing plant recently. A brochure highlighting historic buildings in the neighborhood had led him to it.

"What a shame," he said, "that it's vacant."