

## COVER STORY

# Tape tales

## Boulder County helping state earn reputation for data storage industry niche

If Colorado isn't already considered the tape drive capital of America, it should clinch the title by next year, when three Boulder County start-up companies unleash their drives on the market.

The local trio — Ecrix Corp., Benchmark Tape Systems Corp. and OnStream Inc. — are developing drives designed for markets ranging from desktop to low- and mid-level servers, and each has pinned its prospects for success in the crowded tape

storage industry on dramatically different strategies and technologies.

Add those upstarts to Boulder County's roster of established tape storage companies — which includes Storage Technology Corp., Exabyte Corp. and Breece Hill — as well as sizable tape storage operations elsewhere in the state, such as Quantum Corp.'s massive

Colorado Springs plant, and it's easy to understand why industry observers have lofty opinions of the state. One even called it a haven for tape technology.

Yet even more intriguing, analysts say, is the emergence of three legitimate tape drive start-ups in one county — a concentration found nowhere else in the country.

"It's unusual for three firms to

be starting up at the same time, and certainly more so for them to be starting in the same location," said Ray Freeman, president of Santa Barbara, Calif.-based tape storage research firm Freeman Associates. "It's certainly a hotbed of new development there at the moment."

Sure, computer-related start-ups are a dime a dozen these days — especially in Boulder County. But consider the lineup of entrepreneurial muscle behind the local tape-drive start-ups, which

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includes data storage industry icons Juan Rodriguez, Kelly Beavers, Jesse Aweida, Lew Frauentelder and Bill Beierwaltes. All told, these men have founded or served as chief executive at companies that today employ 4,443 people in Boulder County and almost 11,200 globally.

As well, the new companies' tape drives promise technology that should garner some industry attention, at the least. Benchmark's drives are based on Quantum's market-leading Digital

Linear Tape technology; OnStream's are based on Philips Electronics' Digital Compact Cassette; And Ecrix's will feature entirely new technology.

Even so, the prospect of the three start-ups — or even one of them — thriving in the tape drive industry is not a given. Freeman Associates estimates that nearly 5 million tape drives will be shipped this year in what it calls the "compact" tape drive market, which includes both desktop and server drives.

What's more, the firm predicts that figure will remain stagnant through at least 2000, as increasingly cheaper disk storage options chip away at any growth the tape storage industry might achieve. Traditionally, customers needing to store large amounts of data have preferred tape storage as a cheaper alternative to disk storage.

In the end, Freeman speculated that much of the start-ups' success might hinge on whether they can expand the overall tape

storage market rather than concentrating on competing for market share with established companies.

"If they have a highly competitive offering, they can deliver it, then I'm sure they can succeed," Freeman said. "The extent to which they will flourish is harder to predict."

The following stories offer a look at each of the new companies and what they have so far revealed about their technologies and strategies.

# StorageTek founder launches Benchmark Tape Systems

*The Boulder firm is basing its drives on Quantum technology*

One strategy for making a splash in a market jammed with competition is to associate yourself with a proven winner. That's the plan for Benchmark Tape Systems Corp.

The 9-month-old start-up, founded and majority-owned by former Storage Technology Corp. founder and chief executive Jesse Aweida, is developing a tape drive based on technology it has licensed from market leader Quantum Corp. Benchmark plans to ship the drives — which are based on Quantum's Digital Linear Tape technology — to customers in the mid-range, PC-based network server market next year.

Aweida approached Quantum about a deal late last year. And why not? Since buying its Digital Linear Tape technology from Digital Equipment Corp. in 1994, Quantum has watched DLT quickly climb to the top of the mid-range market. According to San Jose, Calif.-based market research firm Dataquest, Quantum shipped 356,365 DLT drives last year after shipping only 30,000 in 1994.

Noting that DLT was "the only real success" he has seen in tape storage for several years, Aweida



PAUL ALLEN / Daily Camera

Jeff Jennings, left, and Mike Burke, right, engineers with Benchmark Tape Systems Corp. work on tape drive design at the company's Boulder offices.

proposed a licensing deal to Quantum and eventually came to terms with the Milpitas, Calif.-based data storage giant. Quantum had launched development of a lower-end line of DLT products in Louisville in 1996 but later considered shelving the project — which many say is now the basis for Benchmark's drives. In exchange for licensing some DLT patents and technology to Benchmark, Quantum received a minority ownership stake in the Boulder company. Benchmark gained a leg up on most other

start-ups.

"That's exactly where I saw the advantage and that's why we are where we are today," Aweida said. "Without that hook, we'd be just like any other company."

Industry observers confirm Benchmark's advantage. And any edge is needed in a market that includes established products of Sony Corp., Hewlett-Packard Co. and Seagate Technology.

"Although it will be difficult for any tape drive start-up to be heard

See **BENCHMARK** page 14

# Ecrix targets mid- to low-end server market

*StorageTek and Exabyte veteran founded company two years ago*

People take notice when someone like Juan Rodriguez says something like this:

"In my mind, it's the most revolutionary change in the time that I've been in the data storage industry."

Rodriguez, a founder of both Storage Technology Corp. and Exabyte Corp., is speaking of the technology his firm, Ecrix Corp., has designed for its new tape drives. Ecrix's "VXA" architecture combines several new technologies that enhance the drive's ability to read and write data on tape while also keeping its production costs low.

Ecrix, a 2-year-old firm, has yet to publicly reveal the specifications of its drive — such as its data storage capacity and the rate at which it can transfer data to and from tape — but the Boulder company has said it will target the mid- to low-end server market. Ecrix plans to start shipping its helical-scan drives, which use 8 mm tape, early next year.

"This is a critical period of execution," Rodriguez said. "Right now, our success is more dependent on us than anything else. I think we're relatively



JESSICA BRANDI LIFLAND / Daily Camera

**Ecrix Corp. president Kelly Beavers, left, and chairman and chief executive officer Juan Rodriguez, right, sit behind a shelf of prototypes of the Boulder company's new tape drives.**

independent of the economy, of the size of our market. At this time, we have to put the product out to customers, to make sure they like it and to get the product into volume production."

Ecrix — with a name derived from the French word *ecrit*, for "to write" — handles its product design, testing, marketing and sales support at its 40-employee Boulder office. The company's drives and tape cartridges will be manufactured by an unidentified Japanese company.

Rodriguez launched Ecrix in

May 1996 with former StorageTek and Exabyte colleague Kelly Beavers. Rodriguez, a former IBM engineer, founded StorageTek with three others in 1969, and Beavers later joined the Louisville data storage company directly out of college. Both men left in 1985 to start Exabyte, which they positioned to produce tape drives and tape libraries for markets below those served by StorageTek. Rodriguez served as Exabyte's chief executive officer and Beavers

See **EGRIX**, page 14

# OnStream drives based on Philips technology

## *The Longmont firm has backing of the Dutch electronics company*

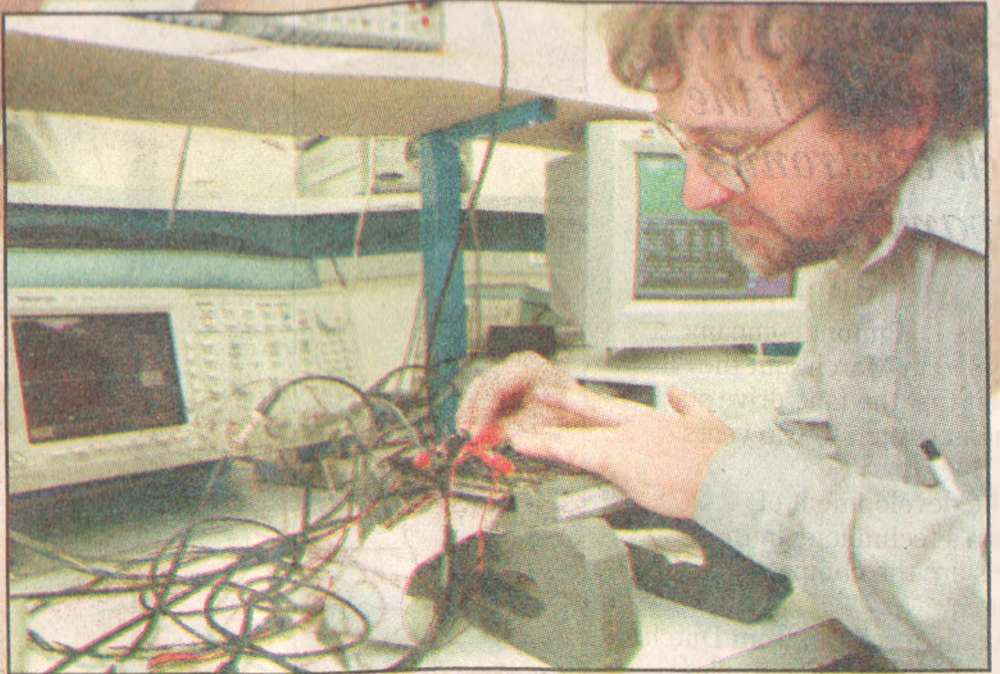
OnStream Inc. executives will tell you the Longmont company was founded in March, but they'll also admit that the tape drive start-up's origins stretch to two years earlier.

And the development of OnStream's technology in those two years are the company's main advantage.

OnStream, a spin-off from Dutch heavyweight Philips Electronics, has developed a line of digital tape drives it will start shipping to customers early next year. The drives — two for the server market and two for the desktop market — are derived from Philips' Digital Compact Cassette technology, which Philips had developed for use in digital recording of music.

But when DCC didn't succeed on the market, Philips decided to adapt the technology for data storage uses. As a result, Philips has invested more than \$100 million in developing its Advanced Digital Recording technology since 1996. And DAR, of course, is the cornerstone for OnStream's drives.

"A lot of new companies don't have the benefit of starting with technology that has been developed to this point, as well as



JESSICA BRANDI LIFLAND / Daily Camera

**Geoff Terrell**, an OnStream Inc. advisory engineer, works with one of the Longmont company's tape drives to create modifications for future products.

with 47 patents," said Andy Grolnick, OnStream's vice president of marketing in Longmont.

Unlike its fellow Boulder County tape drive start-ups, OnStream announced specifications for its drives last week. OnStream's two drives for the PC-server market will offer data capacities of 50 gigabytes and 30 gigabytes, and each will have a data transfer rate of up to 2 megabytes per second. The 30-gig drive will sell for \$499, and the 50-gig drive for \$699.

OnStream's two desktop drives

— one internal and the other external — both have 30-gigabyte capacities and transfer rates of 1 megabyte per second. The internal drive will cost \$299. The external drive will cost \$399.

Perhaps the most innovative aspect of OnStream's technology is the head it has designed for its drives. A drive's heads read and write data on a tape's "tracks." OnStream's heads can read eight tracks simultaneously, whereas most drives in the industry read

See **ONSTREAM** page 14

## Benchmark rides Quantum DLT wave

Continued from Page 13

in the highly competitive climate of the tape drive industry, Benchmark has two things on its side." Dataquest tape storage analyst Fara Yale wrote in an October report. "One is its staff and the other is the fact that, because the company has licensed technologies from Quantum, it is not starting from ground zero in the development of its tape product line."

Similar to the approach taken by fellow Boulder start-up Ecrix Corp., Benchmark says it will not reveal specifications for its drives — such as data storage capacity or data transfer rate — until it draws closer to shipping them. Benchmark marketing director Mike Befeler said the company's drives, which use 1/2-inch tape, will offer better performance and capacity at a comparable price to established 4-mm drives.

Benchmark will handle initial production of about 10,000 drives at its Boulder headquarters, but high-volume production will be handled by an unidentified foreign manufacturer. Benchmark is also working with other manufacturers to develop its tape and a tape autoloader.

Meanwhile, Quantum's decision to license some DLT technology to Benchmark does not mean Quantum will pull back from its lower-end markets, specifically the tape storage market for Windows NT servers. "It's probably about half of our business, so it's not an area we've chosen to neglect at all," said Jeff Seltzer, a Quantum DLT marketing director.

Aside from licensing leading technology, Aweida has staffed Benchmark with industry veterans. Aweida, 67, serves as Benchmark's chairman and chief executive officer. Lew Frauenfelder, 58, a founder of Longmont-based Intellistor and former top executive of Fujitsu Computer Products of America, serves as Benchmark's president and chief operating officer. As well, most of Benchmark's 25 employees have at least 20 years of experience in tape storage.

"They are savvy, experienced people, and they are parlaying a well-accepted technology, so I think they have to be taken seriously," said Ray Freeman, president of Santa Barbara, Calif.,-based Freeman Associates, a research firm that monitors the tape storage industry.

Aweida seems unphased by the prospect of competing in some markets with Ecrix, a Boulder start-up launched by fellow StorageTek founder Juan Rodriguez. The two are next-door neighbors in southeast Boulder.

"Juan and I are friends," Aweida said. "It's sort of like he's going to find his customers and we're going to find ours. ... We feel that this technology is better in performance and reliability (than others in the market)."

Benchmark's Boulder office handles the company's sales, marketing, distribution, research and development, service and customer support. Benchmark executives see the local office's staff doubling within a year, and the company hopes to double its 8,000 square feet of floor space by early next year.



Aweida



Frauenfelder



Befeler

## OnStream a Philips spin-off

Continued from Page 13

far fewer at one time. An eight-track head (pictured in the background of Page 13) reduces wear on the tape, contributes to the drive's ability to vary its speed with that of the computer feeding it data and cuts down on the noise created by the drive's operation.

For its desktop drives, OnStream has designed software, which it calls Echo, that allows users to instruct their tape drives to automatically back up changes to data on their hard drives. As well, desktop customers can use Echo to view a video catalog of the data they have stored on each of their tape cartridges.

Bob Amatruda, a tape storage analyst with market research firm International Data Corp., said the pricing and capacities of OnStream's drives will make them competitive in the market. He added, though, that producing the drive is only one step in getting it to customers.

"Certainly, they're identifying an area that has high potential for growth," Amatruda said. "That's an area that a lot of companies are focusing on — that low-cost, PC-server market. There certainly is opportunity there. But the issue is if (OnStream) can establish sales and distribution channels and have (original equipment manufacturer) support as well."

That's where OnStream's connections to Philips and its own seasoned management might come into play. Philips recruited former Colorado Memory Systems founder and chief executive Bill Beierwaltes to serve as OnStream's chairman and chief executive. Beierwaltes, now 55, had stayed mostly retired since selling Colorado Memory Systems, a Loveland-based tape drive maker, to Hewlett-Packard Co. in 1992. As well, OnStream is armed with a strong 1999 marketing budget, by start-up standards, it says.

OnStream also has significant financial backing. Aside from the ownership stakes of Philips Electronics and Beierwaltes, shares of the company are owned by venture capital firms GE Capital and Charterhouse International.

OnStream's 40-member headquarters staff handles the company's administration, finance, sales, customer support and some product development. The company's local operations are housed on the second floor of Adaptic Inc.'s Longmont plant.

Much of OnStream's production, including that of memory chips and head assemblies for its drives, will take place at its 250-employee plant in Eindhoven, Netherlands. The company has partnered with Verbatim Corp. to produce its tape cartridges.

Though OnStream's ADR technology seems a good fit for the tape drive industry, that doesn't mean OnStream and Philips will limit its applications to computers.

"With high-definition television coming on line, there is going to be some sort of digital VCR. ... And we think we may have something that can work there down the line," Grolnick said.

## Ecrix plans to introduce first 'non-streaming' drive

Continued from Page 13

later joined the Louisville data storage company directly out of college. Both men left in 1985 to start Exabyte, which they positioned to produce tape drives and tape libraries for markets below those served by StorageTek. Rodriguez served as Exabyte's chief executive officer and Beavers as its top engineering officer.

By the early 1990s, both men left Exabyte to start Datasonix, a Boulder company that produced small external tape drives, mainly for laptop computers. Yet the company's drives eventually proved too expensive to produce, and Datasonix, a company funded by venture capital, came to what Rodriguez describes as "a peaceful end" by 1996.

Rodriguez and Beavers then formed Ecrix and spent two years drawing on their past data-storage experience to produce a unique tape drive format. In Beavers' words, Ecrix specifically did not want to design a "me-too" drive. The result is a drive which Ecrix says will rely on electronic advancements to boost its performance instead of the costly mechanical improvements typical of the rest of the industry.

"I think the most important thing is we've been able to develop the technology to the point where we've been able to implement it in a format that meets our goals in terms of cost, size, power, flexibility and reliability," Beavers said.

Rodriguez, 57, is Ecrix's chairman and chief executive officer. Beavers, 46, is its president and chief operating officer.

A primary selling point for Ecrix's drive is that it does not operate in the "streaming" format typical of its competitors, the company says. A streaming drive must receive data in a uniform stream. Whenever that stream is interrupted — which is common, because host computers tend to deliver data in bursts — a streaming drive has to stop, back the tape up, wait for the computer to supply more data and then accelerate forward to its original speed to find the point at which it left off. That process, called "backhitching," tends to strain both the tape and the drive, eventually throwing off the system's performance.

Ecrix's VXA technology eliminates streaming and backhitching through three primary advancements. A glance at each:

The drive's "variable speed operation" allows it to match the speed of data being supplied by its host computer, thus giving it better recording speed and reliability in correctly recording data. The drive achieves this through the programming in its primary memory chip and a combination of the following two technologies.

The drive's "digital packet format" involves recording data in individual, 64-byte packets instead of in a continuous stream. The drive assigns each packet its own numerical "address," which allows the drive to read the packets out of sequence and then rearrange them into the proper

sequence when needed. Thus, if the drive's tape is not properly aligned, and a packet is then read out of sequence, the drive does not have to stop and back up — or backhitch — to find out what happened.

Dividing data into packets also allows Ecrix to put more data into each "track" on the tape. By recording 387 data packets on each tape track, Ecrix increases the tape's storage capacity by boosting its "track density."

Finally, the drive's "overscanning" function involves two drive heads reading the same area of a tape track one after the other. The second head to pass over the track reads the data recorded by the first head to ensure its accuracy. By scanning the area of the track instead of just the track itself, the heads are assured of catching any data packets that might be off-track due to any misalignment of the tape. Subsequently, catching all of the data packets with either or both heads helps eliminate backhitching.

"They have a very forgiving technology," said Ray Freeman, president of Santa Barbara, Calif.,-based tape storage research firm Freeman Associates. "As a result of that, they don't have to spend a lot of money to make sure (their tape and heads are) staying on track. Other drive companies spend a lot of money to establish the mechanical precision required to keep the head on track, often involving a servo system."

Even with its technological innovation, Ecrix still has a tough road ahead in breaking into the crowded tape storage market. Because its technology is new — and not a derivative of a larger company's technology — Ecrix will face "enormous challenges" in gaining market share and awareness for its drives, one analyst said.

But if Ecrix can show customers that it has sufficient money for advertising and promotion to gain market share, it will get some attention, said Fara Yale, an analyst with San Jose, Calif.,-based market research firm Dataquest.

"While Dataquest does not rejoice in the introduction of yet another tape format, we do believe that Ecrix's VXA technology and Ecrix's claims of reliability, low price and guaranteed data interchange will prove to be intriguing enough to stimulate resellers and (original equipment manufacturers) to take a close look at Ecrix products," Yale wrote in a recent report on Ecrix.

Ecrix is owned by a combination of Rodriguez, Beavers and venture capital firms Centennial Fund LP and Chase Capital Partners. The firm recently signed a lease for a 26,000-square-foot space at 5525 Central Ave., roughly across the street from its 11,000-square-foot office at 5500 Central Ave. Paul Whiteside, a broker with Boulder real estate firm Keys, Whiteside & Hart, represented Ecrix in its lease negotiations.

Ecrix anticipates doubling its 40-member Boulder staff within nine months, Rodriguez said.