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HIGHER EDUCATION
UNITED STATES

Oregon State University

Oregon State University's AI-driven research ships help us breathe easier amid climate change

AI powered by the Dell AI Factory helps Oregon State scientists understand the health of plankton and drive strategies for addressing climate change.

Organization needs

With real-time data processing and advanced imaging, Oregon State innovates oceanic research that can benefit human lives globally. To generate meaningful insight from its plankton data findings as efficiently as possible, Oregon State deploys solutions from the Dell AI Factory to transform research ships into edge devices to run AI.

Organization results

- Enables real-time or near real-time results using AI analytics.
- Drives timely, data-fueled decision-making and planning to mitigate climate change.
- Leverages high performance computing with an excellent enablement for AI applications.
- Offers affordable model for scaling research to additional research vessels with AI labs.
- Allows fast, secure sharing of data and AI insights with the global science community.

Solutions at a glance

- Dell AI Factory
  - Dell PowerEdge with NVIDIA GPUs
  - Dell PowerScale
- Dell PowerSwitch S Series
- Unstructured Data Solutions Cyber Protection Suite

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Analyzes as much as 400TB of data within hours or days instead of up to 25 person-years.

Understanding a biosphere bellwether

Oregon State University uses AI to analyze data at lightning speeds and help decision-makers address urgent climate change concerns that impact the world. The university's research ships sail the Pacific Ocean, gathering data on plankton in order to identify trends that affect it. As plankton generates half the oxygen we breathe and accounts for close to 17% of the protein in the global food supply, any changes it undergoes foreshadow developments likely to impact life planetwide.

Oregon State relies on the Dell AI Factory to provide the enabling technology for advancing the world's understanding of oceanic life and for dramatically minimizing the time to reach meaningful insights. Christopher M. Sullivan, director of Research and Academic Computing for the College of Earth, Ocean and Atmospheric Sciences at Oregon State University, says, "AI solutions allow us to move at the pace of the changing world in which we live."

Actionable insight helps mitigate climate change

In Oregon State's home port at the Hatfield Marine Science Center in Newport, Oregon, research vessels like the recently launched Taani have become intelligent edge devices. Sullivan says, "We deploy solutions from Dell AI Factory on our research ships to run AI at the edge in near real time or real time. We are building brand new ships with entire data centers comprising PowerEdge R Series servers with NVIDIA GPUs, Dell PowerScale storage, Dell VxRail and Dell PowerSwitch S Series switches — all we need to power AI and computing."

Using a net equipped with 8K cameras, researchers take shadow graph images of plankton at 30 frames per second. AI rapidly reviews these images at blazing speed. Bob Cowen, director of the Hatfield Marine Science Center and Associate Vice President for Marine Operations Research at Oregon State University, explains, "A data-gathering project using the same camera resolution would require 20–25 person-years for analysis. With AI, we can do this in hours or days."

Insight gained this way regarding the health and interactions of hundreds of thousands of plankton species helps decision-makers and planners tackle climate change. Sullivan notes, "Dell PowerEdge servers and Dell PowerScale storage allow us to get through the data fast enough that it's relevant to monitoring climate change and helping the planet."

Sharing intelligence with the global science community

During a 10-day research trip, scientists gather close to 100TB of raw data. This turns into 400TB during processing and AI analysis of many billions of plankton organisms — including rare, easily missed species — instead of the thousands they could assess previously. Thanks to 200Gbps Dell S-Series PowerSwitches on the Taani and 100Gbps PowerSwitches at the Hatfield Marine Science Center, AI-analyzed plankton data quickly travels to Oregon State data centers, which run on the same solutions from Dell AI Factory. From there, it's easily shared with scientists anywhere, including research partners in several other countries as well as federal entities like the National Oceanic and Atmospheric Administration (NOAA). Sullivan notes, "Systems provided by Dell AI Factory scale to our needs as new grants come in and users need more resources. We use Dell PowerScale for practically all file service needs in our college, including ransomware protection and full backups."

Edge AI enables smart use of funds and resources

Oregon State will provision several other research ships equipped like the Taani. "Edge AI helps us spend grant money wisely, getting to the right places where we can quantify plankton and gather valuable research data," Sullivan says.

Reviewing data where it is generated at the edge avoids lengthy delays caused by sending it back to a data center. This allows scientists to target research at areas where plankton actually live. Oregon State can spend the $1 million it takes to operate a research vessel for 10 days responsibly on meaningful research.

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"Focusing on our investment in AI helps manage our spending to answer scientific questions, which makes for a greater return on investment," Sullivan explains. "With Dell PowerScale, we can increase our performance and the return on our research investment with greater impact overall. That said, returned ROI on hardware also increases our ability to obtain more grants and widely publish our research."

Partnership for scientific progress

Oregon State finds that its high-performance computing systems and solutions from the Dell AI Factory require minimal deployment efforts. Sullivan describes, "We can implement Dell AI Factory solutions within minutes. Adding services like Unstructured Data Solutions Cyber Protection Suite for ransomware protection is easy and does not impact users. That matters to us because we want to focus on the science." The hardware also tends to be reliable over the long term. "Dell Technologies systems are powerfully supported throughout their entire lifecycles," he adds.

Grant-providing institutions like NOAA understand the value of Oregon State's revolutionary oceanic research and are aware of the performance, robustness and security of Dell Technologies solutions. "Many of our government partners are aligned with Dell Technologies," Sullivan comments. "If I specify Dell Technologies equipment in grant applications, it's already been validated and meets government agencies' security criteria and other requirements."

Oregon State will continue to collaborate with its long-standing technology partner to advance science. Sullivan closes, "Dell Technologies are used throughout many of our computational groups connecting technological innovations with research science. We are eagerly anticipating the Dell PowerEdge XE9680 server with an NVIDIA GPU. It will enable us to generate actionable scientific insight in an even shorter time."

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