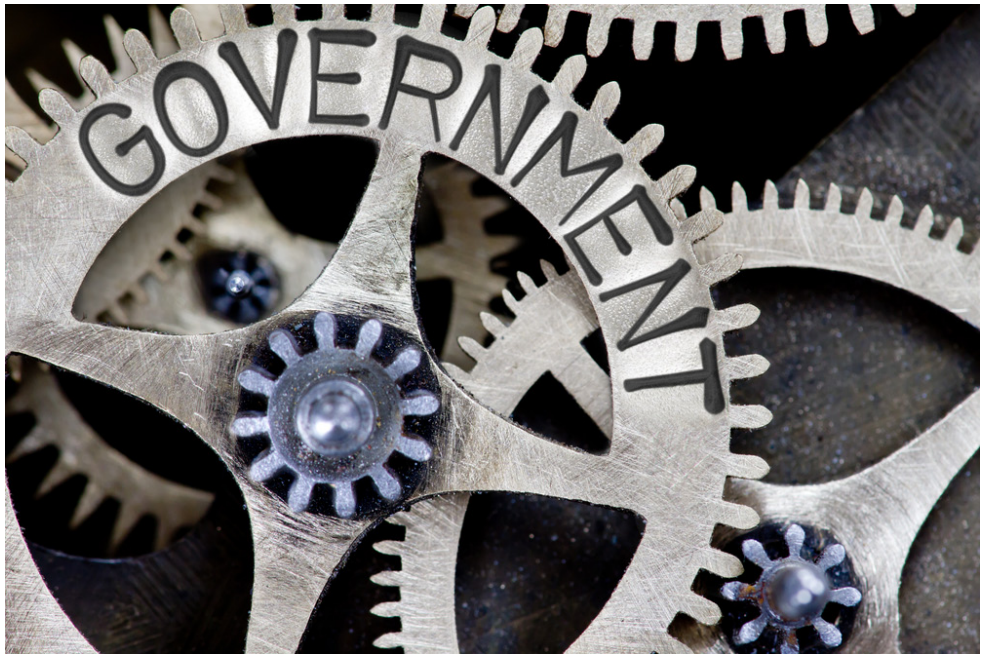
insideHPC

insideHPC Special Report

Citizens Benefit from Public/Private Partnerships

by Michael Schulman



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Introduction

Global citizens face a number of threats everyday, from health issues to natural disasters. Safety for everyone is a top concern — and one that can be helped with artificial intelligence (AI). Indeed, whether it's image recognition of disease in chest X-rays or city video surveillance, high performance computing (HPC) technologies help make the world a safer place.

Disasters, whether naturally occurring or manmade, can happen at any time. When a disaster strikes, one of the most important responses is that of declaring a "state of emergency," which activates certain government-led activities that require coordination and information-sharing. Advanced software, together with powerful hardware, can help first responders and others to identify where emergency personnel are needed, perhaps even before an emergency strikes. Simply put, preparedness in terms of an IT infrastructure can help save lives and reduce the impact of certain types of emergencies.

Now more than ever, agencies from all levels of government are teaming with private Information Technology (IT) organizations to leverage AI and HPC to create and implement solutions that not only increase safety for all, but also provide a more streamlined and modern experience for citizens. The massive amounts of information that are being generated today require modern, high-performance servers, fast networking and storage solutions that easily scale with increased workloads. Heterogeneous computing systems that incorporate various hardware components such as server accelerators can lead to faster and more efficient solutions that are vital for safety and security.

U.S. Government Commitment

In 2019, the U.S. government created a national initiative to foster the research and development of AI tools in government. This executive order directs various agency leaders to set aside some R&D funding in order to pursue the use of AI in various areas. Together, this elevates AI as a national priority across many disciplines.[1]

This action was followed up in 2020 with an annual report declaring that the President's fiscal 2021 budget released earlier this month would give non-defense federal agencies $2 billion to fund AI research and development, which is about double current spending levels. U.S. Chief Technology Officer Michael Kratsios stated, "Our nation remains committed to supporting the development and application of AI innovation that promotes public trust, protects civil liberties, and helps all Americans live healthier and more prosperous lives." The full report can be accessed here: American Artificial Intelligence Initiative: Year One Annual Report

[1] https://federalnewsnetwork.com/artificial-intelligence/2019/02/trump-signs-executive-order-fostering-ai-rd-in-government/

Public Sector Use of Advanced Computing Technologies

There are a wide range of areas in which government agencies are using AI and HPC technologies.

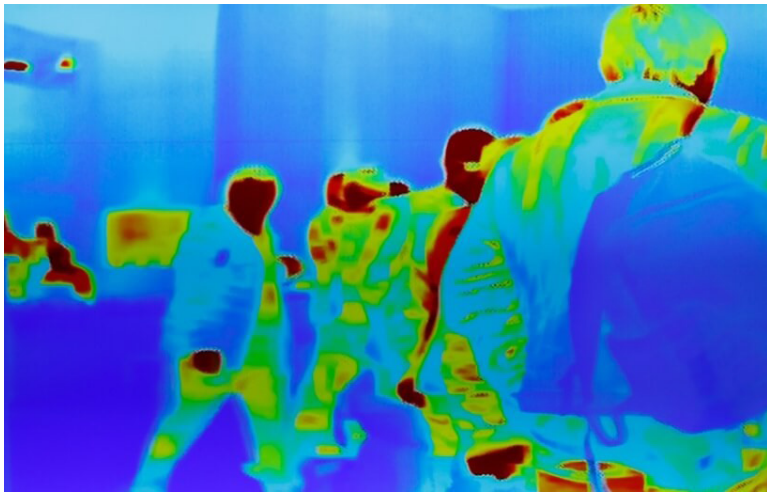
- **Surveillance –** Monitor known threats engaged in certain activities. Many instances exist where surveillance is in the best interest of safety.
- **Emergency response –** Predict and act on disasters. Responders can more easily make sense of disparate data and determine the best course of action.
- **Search–** Make sense of large amounts of unstructured data. Federal agencies deal with many types of data in order to make more informed decisions.
- **Social services –** Identify needs and issues before intervention is necessary. Social workers can more quickly determine if a situation might require immediate attention.
- **Fraud detect on –** Determine possible fraud based on data and patterns. Using large amounts of data from many sources can identify fraud earlier.
- **Defense –** Embedded in weapons systems and logistics systems. Using AI at the edge can lead to appropriate responses in real time.

Emergency response

When a disaster is predicted such as a hurricane, or happens unexpectedly such as an earthquake, masses of data are generated. One of the most important pieces of information is where survivors might be located, based on a number of factors. Much of this data will be unstructured (images, voice, IoT sensors), must be understood and put into a format that first responders need. Even before a disaster strikes, AI can help to position supplies, identify areas that might be most susceptible to property or personal damage. Setting up the response in advance can greatly reduce the costs and potentially save more lives.

With the worldwide pandemic of COVID-19, both public and private organizations are using all available technology resources to come up with treatments and stop the spread of the virus.

HPC systems are being used around the world to search for and develop effective vaccines and treatments.[2] Testing to determine who may be sick with the virus and quarantine has been shown to reduce the spread of the virus. In large gatherings, thermal imaging can help to quickly identify those with a fever.



Search

While search engines are great for research, more targeted searches that a government agency may need might require AI to narrow the results in almost real time. Determining property owners, the number of people in a specific area, or age of a group of people relies on massive amounts of unstructured data and will need state-of-the-art algorithms and HPC techniques.

Social services

Many factors may determine who is at risk in the social services arena. Using AI to determine if a child is at risk or whether a certain individual might be at an increased risk for substance abuse could benefit society as a whole. With AI, increasing monitoring or active intervention can be optimized, creating a safer environment.

[2] https://covid19-hpc-consortium.org/

Fraud detection

Fraud has become a serious problem worldwide. As more and more citizens go online for a variety of transactions, scams have become popular, robbing many of billions of dollars. Using HPC techniques, the potential exists to reduce this financial drain. Early identification of stolen credit card numbers and identity theft can save people from having their bank accounts drained, or possibly governments from having to raise taxes.

Defense systems

With immensely complex weapon systems needing to be on standby 24x7 — often in remote and dangerous environments — AI techniques can greatly enhance the usefulness of these systems. AI can be used to predict when maintenance is needed, to enhance the performance of these systems, and to give operators more confidence in the operational readiness of the systems. In addition, but not just only for weapons, AI can make the supply chain more resilient as well.

Cybersecurity

Like fraud detection, threats are increasing online from many directions. Whether website phishing, malware, ransomware or network intrusions to gain personal and private information, organizations both public and private, must guard against this activity. AI can learn from previous electronic attacks and then modify filters and actions in real time.

Examples

City of Las Vegas

The city of Las Vegas is actively using AI as part of its Smart City initiative, aiming to make Las Vegas a safer city. A goal of this initiative is to decrease response times of first responders and to identify potential problems in advance.

Las Vegas employs a wide range of technology in order to keep its citizens and visitors safe. A combination of video cameras, sound sensors and Internet of Things (IoT) devices allow safety officers to identify and respond to incidents

quickly. The data observed can be compared to historical data to determine anomalies and then alert safety officers quickly. The real-time data can be actually analyzed at the edge where the incident is taking place, significantly decreasing the time that it takes to respond. Alerts can be issued for crowd safety based on a number of factors in real time, reducing the possibility of unruly gatherings and possible criminal activity. Many of these advancements and quick analytics are the result of a combination of new devices, cutting-edge technology and powerful servers.

American Red Cross

The American Red Cross was founded in 1881 and is dedicated to serving people in need. They received their first congressional charter in 1900 and have been tasked by the federal government with providing services to members of the American armed forces and their families as well as providing disaster relief in the United States and around the world.

"Disasters don't stop after 5:00. Now I can log in anywhere I have Internet access. The virtual workplace has really changed how we deploy technology."

Michael Spencer, Technical Lead, American Red Cross

One of the more visible activities of the American Red Cross is that of supplying blood where it is needed, especially in times of large disasters. By using a wide range of technologies, the American Red Cross can quickly set up blood donation centers in advance of anticipated need. By completely transforming their IT infrastructure over the past two years, the American Red Cross can determine where its employees might be needed, reducing delays and enhancing effectiveness. By analyzing weather predictions, for example, blood drives or product transportation can be positioned before disaster strikes.

U.S. Air Force

The U.S. Air Force is charged with protecting the nation's airspace and developing technology for wartime operations. It's a premier example of how a government-funded, large-scale, always-on organization works with private industry to invest in advanced computer technology. In 2017, the U.S. Air Force joined with Dell Technologies to move much of their operations to the cloud. This $1 billion deal with the U.S. Air Force resulted in development of innovative technology solutions that address the needs of a leading organization and their movement to a cloud-based solution.

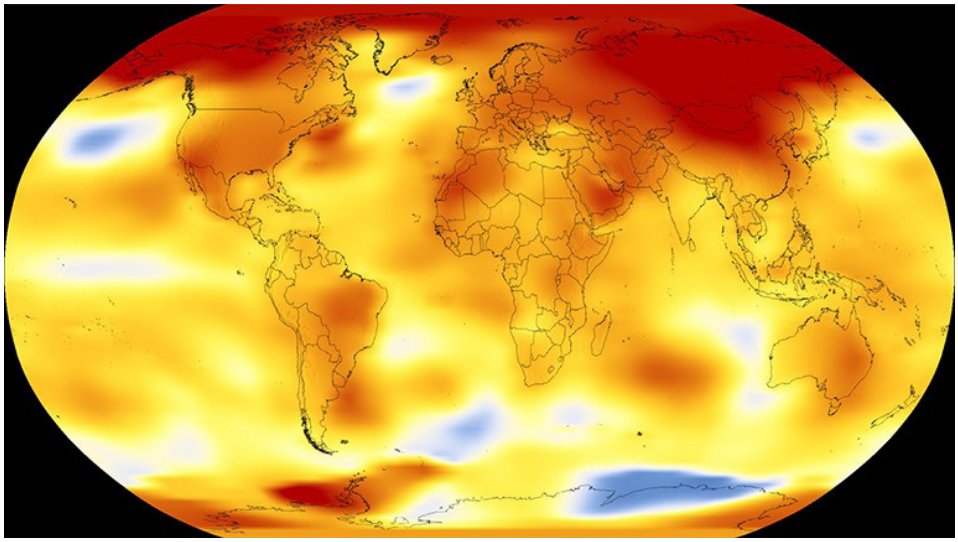
MIT Lincoln Labs

MIT Lincoln Labs works with a variety of organizations, both public and private, to develop advanced technologies that are used for various national security initiatives. MIT Lincoln Labs runs multiple compute clusters with thousands of cores in support of its 1,000+ researchers and various projects.

NOAA

National Oceanic and Atmospheric Administration (NOAA) is an agency within the U.S. Department of Commerce that focuses on the oceans and the atmosphere. NOAA monitors and observes various Earth systems through the use of instruments and data collection. NOAA also researches how these climatic systems change over time.

NOAA is one of the major consumers of computing power in order to study climate change and make more accurate day-to-day weather predictions. NOAA has always been at the forefront of using large-scale computing systems and consistently upgrades their compute and storage infrastructure.



Dell Technologies Leadership

Dell Technologies is the leading vendor of servers worldwide, both in terms of units and revenue, according to IDC.[3] Dell Technologies offers a wide range of PowerEdge servers and software to analyze massive amounts of data, both structured and unstructured. Dell Technologies has partnered with AMD to deliver high-performance servers. And together, the companies are seeing phenomenal results.

Cities across the globe are undertaking projects with Dell Technologies in order to deliver more targeted services and ensure the safety of its citizens.

For example, the PowerEdge C6525 delivered weather modeling results in about half the time of previous-generation AMD EPYC servers for faster severe storm notification. Performance we can rely on, especially during hurricane season. In addition, Dell EMC Ready Solutions for HPC now include the PowerEdge C6525. The Dell EMC Ready Solutions for HPC simplify and shorten the time it takes to design, configure, deploy and maintain HPC systems.

In addition to offering HPC systems, Dell Technologies is committed to working with customers that require advanced technologies such as AI and machine learning to gain insight into their data. Organizations across the globe are undertaking projects with Dell Technologies in order to deliver more targeted services and ensure the safety of its citizens. Dell Technologies also works with today's most innovative organizations today that demand reliable, high performance systems, as well as expert architects and services.

AI is becoming a must-have technology for many industries. Predictive analytics can be enhanced with the inclusion of AI technology, which results in more accurate knowledge of customer interaction, for example. AI can also enhance computer and system security, logistics and supply chains.

Dell Technologies has teams of industry experts that can architect and implement a solution that is optimized for your workloads. The company operates a number of worldwide Customer Solution Centers where customers can explore and test the latest technologies. Customers can take a test drive to work through implementation scenarios and learn more about their specific challenges before deploying at scale. Customers also have access to highly experienced Dell Technology experts in order to prototype innovative solutions.

Dell EMC Ready Solutions are integrated solutions, consisting of servers, software, networking, storage and services. These solutions are targeted at HPC and AI workloads and are created in a building-block fashion. Since workloads may grow, these solutions are designed to be scalable and grow with requirements. Dell EMC Ready Solutions are available for the following workloads:

- Dell EMC Ready Solutions for HPC
- Dell EMC Ready Solutions for AI
- Dell EMC Ready Solutions for Data Analytics

Learn more about Dell EMC Technologies Ready Solutions.

Dell Technologies and AMD

Dell Technologies works closely with AMD to deliver outstanding performance across a wide range of workloads. Dell EMC PowerEdge servers contain the second-generation AMD EPYC™ processors. These processors are designed to deliver tremendous performance, access memory faster and increase I/O bandwidth for the most demanding workloads. Learn more about the Dell and AMD partnership.

[3] https://www.idc.com/getdoc.jsp?containerId=prUS46132420

References

[1] https://federalnewsnetwork.com/artificial-intelligence/2019/02/trump-signs-executive-order-fostering-ai-rd-in-government/

[2] https://covid19-hpc-consortium.org/

[3] https://www.idc.com/getdoc.jsp?containerId=prUS46132420

Further Reading

Dell EMC, Microsoft Win $1 Billion US Air Force Deal

Progress Made Real: Advancing Our 2030 Social Impact Plan through Public Policy

Dell EMC – Federal IT Transformation

Finding a Solution for Ai in Government

Dell Technologies – High Performance Computing and AI Solutions Portfolio

Keeping lifesaving journeys on track

Dell EMC and AMD Partnered to Enable Business Outcomes at the Speed of Innovation