



VIRGINIA ADVANTAGES

Information Technology



**VIRGINIA ECONOMIC
DEVELOPMENT PARTNERSHIP**

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Information Technology is not simply another industry in Virginia, it is central to the success of the Commonwealth. With one of the highest concentrations of technology workers in the country, Virginia has become a world-class center for emerging internet technology, software development, fiber optics and advanced communications companies.

The Information Technology sector is driven by the support of governmental leaders, such as Governor Terry McAuliffe, who launched his *New Virginia Economy* initiative with Executive Order 26. This initiative includes Information Technology, Mod-Sim, Cybersecurity, and Data Centers among its target industries.

Virginia Information Technology companies are recognized as leaders in the industry. This is true for more established companies like Computer Sciences Corporation, a Fortune 500 company, and emerging companies such as ByteCubed which was recognized in this year's Inc 5000 list of the nation's fastest growing private companies.

Virginia offers a dynamic IT industry cluster with a talented and skilled workforce supported by an acclaimed educational system offering a variety of cutting-edge IT degree programs.

Virginia's Information Technology Industry

- Accounts for over 180,000 employees at IT companies
- Consists of an estimated 284,600 jobs at IT and other high-tech companies, as reported in Cyberstates 2016
- Virginia has the 2nd highest concentration of technology workers in the country, with nearly 1 in 10 workers in the tech sector, according to Cyberstates 2016
- Virginia has the highest concentration in the country of technology occupations within the technology industry, with 55% of people employed in the technology industry performing technical jobs, as reported in Cyberstates 2016
- Computer systems design and related services accounts for more than half of the total high-tech employment in Virginia
- Has a direct economic output of more than \$43.7 billion and supports \$37.5 billion in additional economic output in Virginia
- In the past 10 years, over 47,500 jobs have been added in the information technology sector with investment of more than \$11.3 billion, recent announcements come from companies such as:
 - AxonAI
 - Avepoint
 - CACI
 - Carahsoft
 - Carfax
 - Cvent
 - DOMA Technologies
 - Microsoft
 - Sevatec
 - WillowTree Apps

Sources: Virginia Employment Commission, Virginia Economic Development Partnership

Advantages for Information Technology in Virginia

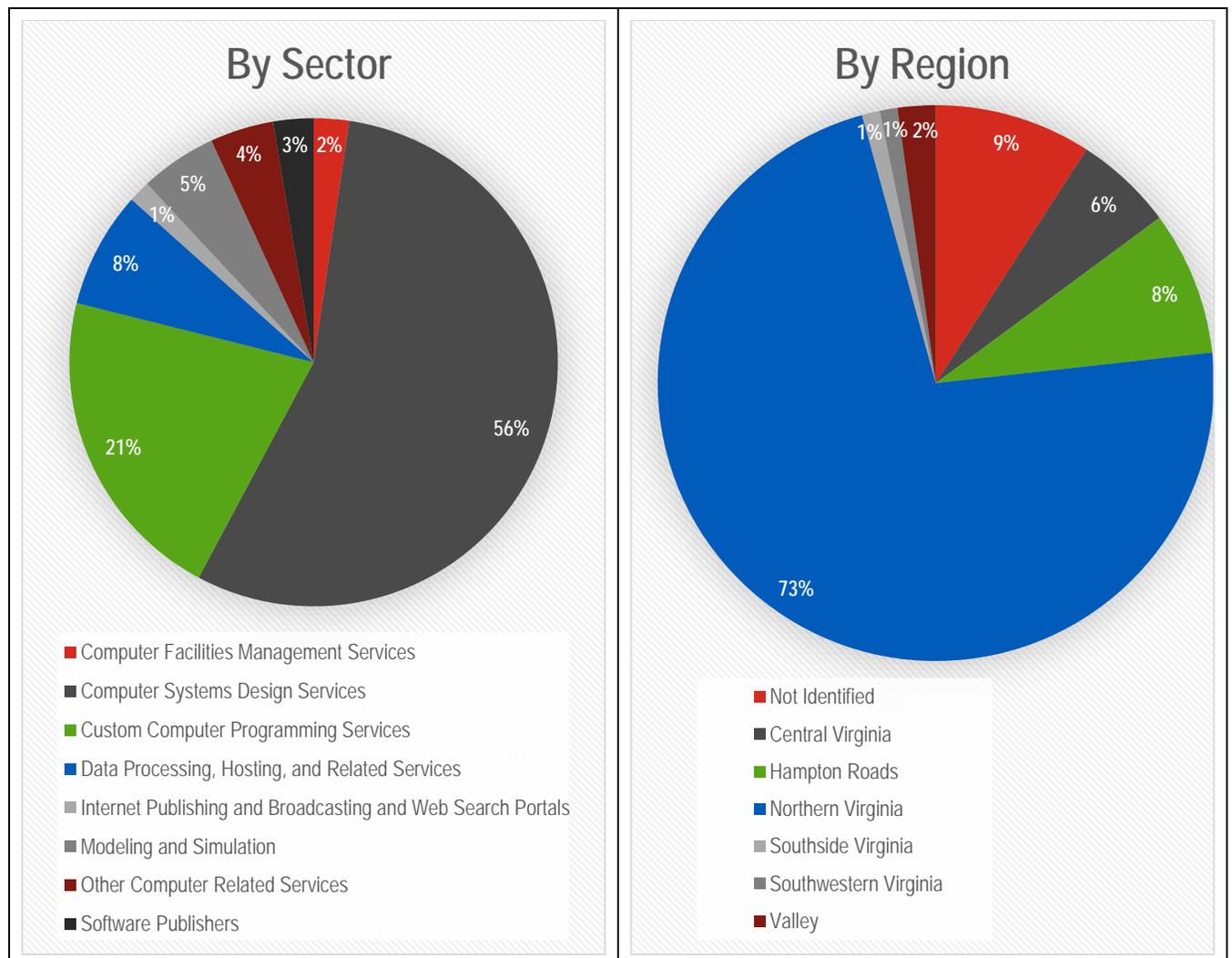


Virginia's Established Industry Base

Key IT companies in Virginia include:

Accenture	Cvent	L-3	Rosetta Stone
Alion	CoStar	Leidos	Serco
Boeing	Exelis	ManTech International	SAIC
CACI International	General Dynamics	Northrop Grumman	Sera Brynn
CGI	Harris Corporation	Oracle	Unisys
CSC	HP Enterprise Services	QinetiQ	ThreatConnect
CSRA	IBM	Raytheon Company	ThreatQuotient

IT Employment in Virginia



Data Centers

As a critical network access point since the early days of the internet, Virginia plays a key role in supporting today's global internet traffic. Virginia hosts prominent commercial internet exchange points and has been one of the most active data center markets in the country with expansions by Equinix, Digital Realty Trust, RagingWire and CyrusOne. As Amazon Web Services and Microsoft have discovered, Virginia's critical IT infrastructure provides a foundation for the web-enabled services of tomorrow.

Aware of the necessity for such provisions as redundant power supply and dual fiber paths, Virginia provides a wide variety of site and building options in both urban and rural settings. With the advance of cloud computing and online services, the demand for data centers is growing on a daily basis, and Virginia provides a timely and cost effective solution for locating these facilities.

Virginia's Data Center Industry

- Over 650 data processing, hosting and related establishments are located in Virginia employing more than 13,900 people.
- 70 percent of the world's internet traffic passes through data centers in Northern Virginia.
- Virginia Beach will host the first transoceanic cable station in the Mid-Atlantic region when Telefonica completes the MAREA cable connecting the city with Bilbao Spain in October 2017. This project is a collaboration between the Spanish telecom company, Microsoft, and Facebook.
- The MAREA will soon be followed by the completion of Telefonica's BRUSA cable which will connect Virginia Beach with Fortaleza, Brazil.

Virginia Assets for the Data Center Industry

- In its 2016 Data Center Outlook report, Jones Lang LaSalle notes that Northern Virginia is the nation's top market with respect to demand.
- In Southern Virginia, Mid-Atlantic Broadband Communities Corporation, a not-for-profit cooperative, offers an advanced 1,800+ mile fiber-optic broadband network and provides access to multiple major fiber optic and telecom service providers.
- The University of Virginia's Dependability and Security Research Group focuses on research issues related to computing systems whose failure would have a severe negative impact. The research interests encompass safety-critical systems, critical infrastructure and emergent grid computer systems.
- The Richmond area has been connected to Ashburn with "dark fiber" giving companies the ability to access data centers at a much faster and more affordable way. The fiber line opens opportunities for companies along I-95 between Richmond and Ashburn, including companies located within the Quantico Corporate Center.
- Major data center companies in Virginia include:
 - Amazon Web Services
 - CyrusOne
 - CoreSite Realty Corp.
 - Microsoft
 - Dupont Fabros
 - Equinix
 - Digital Realty Trust
 - Latisys
 - QTS
 - RagingWire

Targeted Industry Incentives

In addition to the low cost of doing business, Virginia offers an exemption from the Retail Sales and Use Tax for computer equipment bought or leased between July 1, 2010 and June 30, 2035 for use in a data center. The facility must be located in Virginia, generate capital investment of at least \$150 million and create at least 50 new jobs (reduced to 25 new jobs in areas of high unemployment) that pay one and one half times the prevailing average wage in the locality.

Taxpayers with an enterprise data center operation may also use an alternative apportionment formula for corporate income tax after entering into a memorandum of understanding with VEDP and making at least \$150 million in qualified investments. After these investments are verified by VEDP, companies may use an apportionment formula with a quadruple-weighted sales factor from July 1, 2016 through July 1, 2017, and a single-sales factor thereafter.

Cybersecurity

Virginia IT companies, from startups to large systems integrators, are leaders in the development of cybersecurity solutions for industry and government. With the constant advancement of information technology infrastructure security, Virginia-based companies are at the forefront of technologies such as cryptography, forensics, intrusion detection and firewall devices. Likewise, many of Virginia's universities are at the forefront of cybersecurity research and development, while also educating and training the IT professionals of tomorrow.

Virginia's Assets for the Cybersecurity Industry

- Virginia is home to several Federal agencies that focus on cybersecurity, including the U.S. Army Cyber Command (ARCYBER), U.S. Department of Defense, U.S. Department of Homeland Security's National Cyber Security and Communications Integration Center and the Defense Advanced Research Projects Agency (DARPA).
- Since 2013, the MACH37 Cyber Accelerator at the Center for Innovative Technology has launched 40 cybersecurity companies.
- In the summer of 2016, MACH37 began a partnership with the University of Virginia's College at Wise to specifically assist companies in Southwest Virginia. UVA-Wise has already begun to build partnerships with emerging cyber companies, and expects to host companies in its co-working space in late 2017.
- UVA-Wise has also partnered with Southwest Virginia Community College and Mountain Empire Community College in the Southwest Virginia Regional Cybersecurity Initiative, which will position Southwest Virginia as a regional hub for cybersecurity.
- The Center for Secure Information Systems (CSIS) at George Mason University provides a dedicated environment to encourage the development of expertise in both theoretical and applied aspects of information systems security. Established in 1990, CSIS has the distinction of being the first academic center in security at a U.S. university. It is one of the National Security Agency's original Centers of Academic Excellence in Information Assurance Education, a designation it still holds.
- Cybersecurity @ Virginia Tech is an interdisciplinary collection of research groups and laboratories at Virginia Tech organized under the Hume Center for National Security and Technology that focus on the research challenges of cybersecurity. Through these groups, Virginia Tech provides a diverse research portfolio to address the critical challenges that lie ahead in the fields of computer and network security.
- 7 of Virginia's colleges and universities host camps for GenCyber, a national program to help K-12 students learn the fundamentals of Cyber Defense. In 2016, Virginia Tech and James Madison University hosted camps for high school technology teachers to provide them with the skills they need to introduce their students to cybersecurity topics. Marymount University, New River Community College, Liberty University, Norfolk State University, and Old Dominion University hosted camps for K-12 students interested in cybersecurity.
- The list of cybersecurity companies growing in Virginia includes
 - Cyren
 - Distil Networks
 - IKANOW
 - PhishMe
 - PFP Cybersecurity
 - Verisign

Modeling & Simulation

With the advent of modeling and simulation technologies for the purpose of business, companies can visualize and analyze a product or production process to determine constructive solutions to critical challenges, often for a fraction of the cost. Virginia's modeling and simulation industry covers a diverse set of sectors including logistics, product development, training and gaming.

In 2005, Virginia began an initiative to aggressively promote the high-tech modeling and simulation industry by boosting research, encouraging development, and improving the information technology infrastructure. With this preparation and through centers such as the Virginia Modeling, Analysis and Simulation Center (VMASC) and the National Center for Collaboration in Medical Modeling and Simulation (NCCMMS), Virginia is now at the forefront of the modeling and simulation industry.

Virginia's Modeling & Simulation Industry

- Employs over 9,100 people in the private sector
- Federal government and military Mod-Sim employment is estimated at an additional 2,200 people
- Consists of over 140 companies with more than 210 locations
- Since 2005, 24 Mod-Sim projects have announced more than 1,900 new jobs and investments of over \$127 million

Sources: Virginia Employment Commission, Virginia Economic Development Partnership

Virginia Assets for the Modeling & Simulation Industry

- The Virginia Modeling, Analysis and Simulation Center (VMASC), is a multi-disciplinary modeling, simulation and visualization collaborative research center with more than 60 partners from industry, government and academia.
- The Southern Virginia Product Advancement Center (SVPAC) hosts a Modeling and Simulation Center of Excellence including a 3-D cave environment, and provides extensive services to assist advanced technology companies.
- The C4I Center at George Mason University is the nation's first and only civilian university-based entity offering a comprehensive academic and research program in military applications of information technology.
- Virginia Tech's Center for Human-Computer Interaction provides research based on the intersection of social and behavioral sciences and information technology.
- The Virginia Serious Game Institute @ George Mason University is a unique (one of four affiliated facilities in the world, and only one on the East Coast) space that provides research support, prototype development, as well as connections for product commercialization and business support.
- The National Center for Collaboration in Medical Modeling and Simulation (NCCMMS), a joint effort of Eastern Virginia Medical School and Old Dominion University, partners with a variety of academic, governmental and industry partners to advance the quality of medical modeling & simulation-based training and education.
- The list of Mod-Sim companies growing in Virginia includes:
 - SimVentions
 - Mymic
 - Trax International
 - SimIS

GIS/Geospatial Technology

Geospatial Technology is a rapidly expanding industry that crosscuts nearly every discipline and sector of the U.S. economy. Virginia's vibrant geospatial industry mirrors national trends and continues to experience growth and demand for geospatial technicians.

Of all the advances in information technologies that have transformed the way geographers conduct research and contribute to society, Geographic Information Systems (GIS) is probably the most significant. GIS has had tremendous effects on research techniques specific to geography, as well as on the general ways in which scientists and scholars communicate and collaborate.

As with most new technologies, Virginia has been at the forefront of the research and development for GIS, including such areas as Cartography and Computer-Aided Drafting, Photogrammetry and Remote Sensing, Spatial Statistics, General Communication, Research and Publication Technologies.

Virginia Assets for the GIS Industry

- The U.S. Geological Service (USGS), headquartered in Reston, Virginia, is the nation's largest water, earth and biological science and civilian mapping agency.
- Virginia is home to the National Geospatial Intelligence Agency, which provides geospatial intelligence and information for the federal government.
- Seven of Virginia's public universities offer geospatial programs—George Mason University, James Madison University, Old Dominion University, Radford University, Virginia Commonwealth University, Virginia Tech, and Mary Washington. In addition, GIS coursework is available at most of Virginia's community colleges.
- The Center for Geospatial Information Technology at Virginia Tech is an interdisciplinary center that partners with university researchers, government agencies and the private sector to research and develop advanced uses of geospatial technologies.
- George Mason University is home to the Center for Geospatial Intelligence (CGEOINT), which focuses on geospatial and spatiotemporal information extraction, analysis and visualization, and the Center for Spatial Information Science and Systems (CSISS), an interdisciplinary research center.
- The U.S. Army Corps of Engineers Geospatial Research Laboratory (GRL) conducts basic and applied research in geospatial and related sciences to provide the warfighter with superior knowledge of the battlefield. Research programs within the GRL include human geography, geospatial intelligence, and geo-enabled computing environments.
- Major GIS Companies with a presence in Virginia include:
 - Intergraph
 - WorldView Solutions
 - Harris Geospatial Solutions
 - ESRI
 - DigitalGlobe
 - Intergraph Government Solutions

Big Data and Data Analytics

Companies of all sizes are increasingly relying on new data analytics techniques and technology to make smarter business decisions. Companies throughout the Commonwealth are finding innovative uses for the massive amounts of public and proprietary data made available by the internet to benefit themselves and their clients. In fact, Virginia companies MicroStrategy and Logi Analytics were recognized as BI and analytics visionaries in the prestigious Garter Magic Quadrant for 2016.

Governor McAuliffe has made big data and a data analytics a particular priority of his administration. To facilitate this, the Commonwealth has established DataVA. Through DataVA, users throughout the world can access open data sets from Virginia's state agencies. The website also serves as an important location for data analytics news and other resources.

Virginia's colleges and universities are also hard at work performing cutting-edge research in the field and ensuring that companies have the talent they need to thrive.

Virginia's Big Data Assets

- Since 2011, Virginia Tech has operated the Discovery Analytics Center (DAC) with locations in Blacksburg, Falls Church, and Arlington. The DAC provides undergraduate and graduate programs in data analytics and performs research in the areas of visual and text-based data analytics, machine learning, and computational statistics.
- Virginia Tech will also be home to the Molecular Science Software Institute, a National Science Foundation funded collaboration between Virginia Tech and a consortium of seven other universities including: The University of California at Berkeley, Stanford University, and Rutgers.
- The University of Virginia and Virginia Tech have partnered with dozens of universities and private sector companies throughout the region to participate in the South Big Data Regional Innovation Hub. The Hub is part of a National Science Foundation program to use big data technologies and techniques to address societal problems, spur economic development, enhance scientific discovery, and bolster national defense and security. The South Region has a particular research focus on Healthcare, Coastal Hazards, Advance Manufacturing & Materials, and Habitat Planning.
- The University of Virginia is also home to the Data Science Institute (DSI) which has a unique interdisciplinary approach to Data Science. The DSI has four different centers which take advantage of Rivanna, UVA's high performance computing resources: The Center for Automata Processing; The Center for Big Data Ethics, Law, and Policy; Center for the Study of Data and Knowledge; and the Environmental Science-Bay Game.
- Eastern Virginia Medical School (EVMS) in Norfolk is home to the Bioinformatics Analytics Core, a facility that uses cutting edge techniques to analyze large and small data sets for students, staff, and collaborators outside of the university.
- Major Big Data and Data Analytics Companies in Virginia include:
 - CoStar
 - Splunk
 - Amazon Web Services
 - Oracle Corp.
 - Booz Allen Hamilton
 - Northrop Grumman

Education and Training

With more than one in three residents awarded a bachelor’s or advanced degree, the Commonwealth’s workforce is one of the most educated in the nation. Some of the nation’s best colleges and universities are located in Virginia, many offering undergraduate and graduate programs in all areas of business.

2015-2016 Select Degrees Conferred in Information Technology and Related Programs at Virginia Universities and Colleges ¹	
Program Name	Total
Computer and Information Sciences	1,504
Computer and Information Systems Security	70
Information Technology	909
Computer Science	439
Systems Engineering	226
Information Science Studies	395
Management Information Systems	372
Computer Engineering	369
Total IT and Related Degrees Conferred:	4,284

Among Virginia’s quality programs in computer science and related disciplines are several specialized and innovative programs which prepare students for careers in cybersecurity, mod-sim, and other growing fields. In fact, 10 of Virginia’s colleges and universities have been designated as ‘Centers of Academic Excellence’ in Cyber Defense or Information Assurance by the NSA and Department of Homeland Security. Current offerings at Virginia’s universities include:

Old Dominion University

- Master of Engineering, Master of Science, Doctor of Engineering, and Doctor of Philosophy with a major in modeling and engineering
- Master of Science in Computer and Information Systems Security
- Post-Baccalaureate Certificate in Cybersecurity

Norfolk State University

- Master of Science in Cybersecurity

George Mason University

- Master of Arts in Computer Game Design, Bachelor of Fine Arts in Computer Game Design
- Master of Science in Cybersecurity

¹ Source: State Council of Higher Education for Virginia, www.schev.edu

Advantages for Information Technology in Virginia



Virginia Commonwealth University

- Master of Science in Computer and Information Systems Security

Virginia Tech

- Post-Baccalaureate Certificate in Information Assurance Engineering

University of Virginia

- Master of Science in Data Science

University of Virginia College at Wise

- Bachelors in Software Engineering

In addition to degrees, Virginia's community colleges provide students throughout the Commonwealth with opportunities to earn state of the industry certifications including:

- CompTIA A+ Certification
- Certified Internet Web (CIW) Database Design Specialist
- Certified Ethical Hacker
- Cisco Certified Network Associate
- Certified Information Systems Security Professional (CISSP)
- Systems Security Certified Practitioner (SSCP)
- GIAC Security Essentials
- Microsoft Certified Solutions Expert

Virginia has a Skilled and Talented Workforce

From an affordable lifestyle and competitive business environment, to a skilled and ready labor force, Virginia is one of the most desirable places for business in America. Businesses in Virginia enjoy a business-friendly climate characterized by stable and competitive taxes, payroll costs, and lease rates, as well as legislation that protects “at will” employment practices.

Selected Occupations ²	Virginia Employment
Computer and Information Systems Managers	13,830
Computer Network Support Specialists	7,430
Computer Network Architects	9,330
Computer Programmers	8,300
Computer Systems Analysts	25,020
Computer User Support Specialists	20,550
Network and Computer Systems Administrators	20,420
Database Administrators	5,830
First-Line Supervisors of Office and Administrative Support Workers	41,520
Human Resources Assistants, Except Payroll and Timekeeping	4,180
Office Clerks, General	86,770
Receptionists and Information Clerks	30,720
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	40,630

² Source: Bureau of Labor Statistics: Occupational Employment Statistics