CAREER GUIDE

TECHNOLOGY: THE CAREER OF THE FUTURE

NATIONAL UNIVERSITY

WHY COLLEGE?

When most people consider the value of a college education, the first thought is economic advantage. And indeed, that benefit is widely documented. A recent report in the *Washington Post* estimates that an individual with a bachelor's degree is likely to earn a million dollars more over the course of a lifetime than their companions who have only completed high school. Using those calculations, the study estimates that the value of a college degree is somewhere in the environs of $970,000[1].

The financial benefits aren't just for those with a bachelor's or more advanced degree. When a student completes just a year or two of college, earnings increase accordingly[2]. During the recent recession, the population that suffered the greatest job loss was that group with no post-secondary education, followed by the group with some post-secondary education. The group that suffered the least was that with college degrees and advanced college degrees. According to the study, 86 percent of college graduates find their college education worth the money they put into it[3].

MORE BENEFITS OF A COLLEGE EDUCATION

A college education offers benefits far beyond those of financial comfort and increased job security. A report from the Institute for Higher Education Policy indicates that college graduates enjoy greater savings, a wider range of personal and professional options, a better quality of life and more leisure activities[4]. A study by the Carnegie Foundation indicates that college educated citizens tend to become more open-minded, cultured, rational, more consistent and less authoritarian[4].

Studies also show that higher education is better for families. The same study by the Carnegie Foundation shows a correlation between higher education and health, not only for graduates, but also for their children[4]. For working mothers the news is especially good as another study shows that college-educated women tend to spend more time with their children with the aim of better preparing them for the future. Another benefit: college graduates tend to have a more optimistic view of both the past and the future[5].

COMPUTER TECHNOLOGY

Why pursue a career in computer technology?

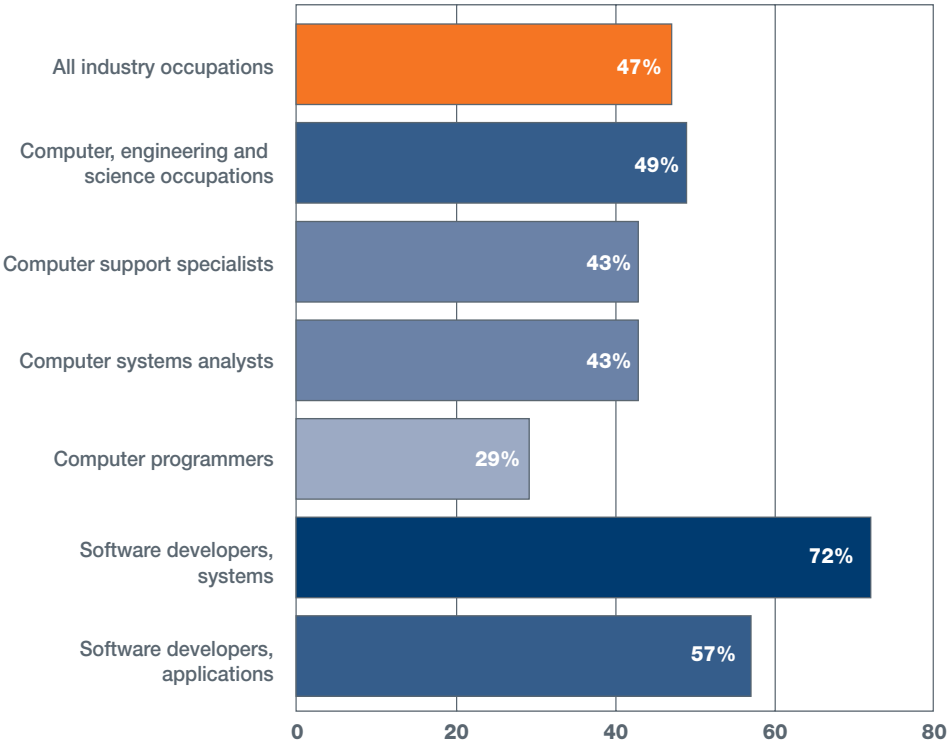
Over the past fifty years we have seen sweeping changes at the intersection of technology, communication, and entertainment, that have paved the way for new systems, devices, and applications. Not only do these advances enhance business operations and lifestyles, they also open up a new world of career opportunities. Virtually every business today relies on some form of technology, so those individuals with technical skills, especially in computer science and information technology (IT), are in high demand. Developments like social media, cloud storage, the expansion of smart devices in the workplace and increasingly intelligent threats to cyber security present fresh challenges for technology professionals, keeping the field exciting and interesting.

The field of computer technology presents a variety of employment options to suit a wide assortment of skill levels and preferences. At their essence, computer science and IT are innovative professions with positions that range from supporting technology users, providing new solutions for the latest problems, developing software to increase efficiency and much more.

What jobs are available for technology majors?

According to the Bureau of Labor Statistics, technology employment has grown by 37 percent since 2003. During the recent recession the IT industry lost only 1 percent of its workforce, but otherwise maintained employment. Between 2010 and 2020, the value of the goods and services produced in the computer technology-related fields is expected to grow at an average annual rate of 6.1 percent, compared with 3.6 percent for the broad industry category—professional, scientific, and technical services—compared to 2.9 percent for all industries. Employment in computer systems design and related services is projected to grow 3.9 percent annually from 2010 to 2020[6].

Projected percent change in employment in selected occupations in computer systems design and related services, 2010-2020



Source: U.S. Bureau of Labor Statistics, Employment Projections Program

Employment in the field of technology is projected to grow steadily in coming years.

You will find computer technology majors in a wide variety of professions, including:

- Computer science
- Information systems
- Data analytics
- Cyber security
- Database administrators
- Computer systems analysts
- Computer programmers
- Software developers, applications
- Software developers, systems
- Computer hardware engineers
- Computer support specialists
- Computer and information research scientists

Computer and mathematical occupations make up about 56 percent of the computer systems design and related services industry. Software developers make up the largest portion of the industry, with a 20-percent share.

What computer technology professionals do:

Applications software developers design programs, from spreadsheets used by accountants, to electronic maps that help give people directions, to increasingly popular mobile games. Applications developers often design software that is offered through cloud computing. Employment of this occupation is projected to grow 57 percent from 2010 to 2020[7].

Systems software developers create and upgrade operating systems, the software that supports a computer's basic functions such as scheduling tasks, executing applications, and controlling peripherals. Employment of systems software developers is projected to grow 72 percent between 2010 and 2020[7].

Computer support specialists provide help and advice to people and organizations using computer software or equipment[7].

Computer programmers write code to create software programs. They turn the program designs created by software developers and engineers into instructions that a computer can follow[7].

Information technology managers and computer systems analysts study an organization's current computer systems and procedures and make recommendations to management to help the organization operate more efficiently and effectively[7].

Technology product managers oversee product strategies from planning to tactical activities, specifying market requirements for current and future technology products, conducting research and driving solutions across development teams[7].

Who hires computer technology majors?

A major in computer technology is especially versatile as companies across all sectors, including finance, retail, energy, healthcare, education, government, hospitality and entertainment, now employ tech workers. According to BusinessInsider.com[8], the biggest employers of technology professionals today include:

- Oracle
- Dell
- Amazon
- Microsoft
- Lockheed Martin
- IBM
- SAIC
- ADP
- Hewlett Packard
- Northrop Grumman

A person with a
BACHELOR'S DEGREE
can expect to earn
$2.27 million
over a lifetime, compared to
$1.30 million
for those with just a
HIGH SCHOOL EDUCATION.[1]

COMPUTER SCIENCE

Why pursue a career in computer science?

Computer science is the study of computers, computer systems, software and software systems; and is central to the current labor market and indeed, to modern business. Many, if not most, organizations use computers. Because of this, career opportunities for those with a degree in computer science are diverse and growing.

Programming is an important part of computer science, but there's much more to this field. The issues that computer scientists deal with every day can be abstract as well as tangible. Areas of study include such diverse subjects as object oriented programming, data structures and algorithms, operating systems, computer communication networks, artificial intelligence, software engineering, computer-human interaction, business data processing, computer systems and networks, database systems, graphics and visuals, numerical analysis, programming, software engineering and computer architecture and more.

Students who earn a bachelor's degree in computer science may find entry-level employment as:

- Assistant analysts
- Computer software engineers, developer
- Computer software engineers, applications
- Computer programmers
- Manufacturing engineers
- Software developers
- LAN administrators
- Programmer analysts
- Database administrator

With further education, students can find employment as:

- Consultants
- Programming supervisors
- Systems analysts/network administrators
- Systems integration services consultants
- Associate consultants

Who hires computer science graduates?

Although they can find jobs in most industries, many computer software engineers work in technology and product development organizations. Employers range from startups to well-known industry leaders. A growing number of these workers get jobs on a temporary basis or work as consultants.

Employment for computer scientists is expected to grow much faster than average compared to all other occupations for the 2008 – 2018 decade and job prospects are excellent. Employment for computer scientists is projected to increase by 24percent, partly due to the rapid growth in computer systems design and related services industry, as well as the software publishing industry, which are projected to be among the fastest growing industries in the U.S. economy[9].

Both applications software engineers and systems software engineers are projected to be among the fastest growing occupations from 2008 to 2018. Rapid growth in the computer systems design industry should mean good opportunities for college graduates with a degree and some experience. Employers will look for software engineers with a strong background in programming and systems analysis, along with business and people skills.

The number of computer software engineers is expected to rise much faster than the average, as businesses are looking for new ways to get ahead of competition. Employment of software developers is projected to grow 30 percent from 2010 to 2020, much faster than the average for all occupations. The main reason for the rapid growth is a large increase in the demand for computer software.

Employment of computer hardware engineers is expected to increase 9 percent from 2010 to 2020, slower than the average for all occupations. A limited number of computer hardware engineers will be needed to meet the demand for new types of computer hardware because more innovation in computers now takes place with software than with hardware[10].

Employers of computer science graduates are computer manufacturers and software companies as well as many other businesses:

- Software and computer companies
- Business and industry
- Consulting firms
- Banks and investment firms
- Colleges/universities
- Government
- Telecommunications
- Professional and technical journals
- Research and development
- International agencies
- Military
- Internet service providers
- Local and state government

INFORMATION SYSTEMS

Why pursue a career in information systems?

Information systems managers (often called IT managers or IT project managers; sometimes referred to as computer and information systems managers), plan, coordinate, and direct computer-related activities in an organization. They help determine the information technology goals of an organization and are responsible for implementing computer systems to meet those goals.

IT managers are responsible for analyzing an organization's computer needs and for recommending upgrades, as well as planning and directing, installing and upgrading computer hardware and software. The position is dynamic since an important part of the job is to research the latest technology and look for ways to upgrade computer systems.

IT managers typically consult with other managers to determine the role of the IT system in an organization, researching emerging technologies with an eye towards increasing the organization's efficiency and effectiveness. They will prepare an analysis of costs and benefits to help determine if computer upgrades are financially worthwhile and figure out ways to make existing computer systems meet new needs. They may also design and develop new systems by configuring hardware and software and oversee the installation and configuration of the new system, sometimes customizing it for the organization. Once installed, system analysts will test systems to ensure they work as expected and train the systems' end users, providing written instruction when required.

A bachelor's degree in computer science or information systems plus related work experience is typically required for employment in IT management. Many IT managers also have a graduate degree.

Generally, people who hold a degree in information systems management pursue careers as:

- Chief information officers (CIOs)
- Chief technology officers (CTOs)
- IT directors
- IT security managers
- Systems analyst
- Consultant
- IT specialist
- End-user support analyst
- Teacher-trainer
- Network analyst
- Programmer
- Application developer

Who hires IT managers?

As organizations across the economy increase their reliance on information technology, workers in this occupation will be hired to design and install new computer systems. Growth in wireless and mobile networks will create a need for new systems that work well with these networks. Additional job growth is expected in healthcare fields. A large increase is expected in electronic medical records, e-prescriptions, and other forms of healthcare IT, and analysts will be needed to design computer systems to accommodate the increase.

There is also expected to be an increase in the number of IT managers and analysts working at IT consulting firms. These professionals, who will be hired by organizations in a variety of industries to design computer systems, will move on to another business when they are finished. As more small and medium-sized firms demand advanced systems, this practice is expected to grow. IT manager jobs are expected to grow 43 percent in the computer systems design and related services industry[6].

Employment of computer and information systems managers is projected to grow 18 percent from 2010 to 2020, about as fast as the average for all occupations[7]. Growth will be driven by organizations that are upgrading their IT systems and switching to newer, faster, and more mobile networks. Consequently, more employees at all management levels will be needed to help in the transition.

Additional growth is likely to result from the need to increase security in IT departments. More attention is being directed at cyber threats, a trend that is expected to increase over the next decade.

Most large companies have IT managers. The largest concentration work for computer systems design and IT services firms; other employers of IT management graduates include:

- Financial services
- Manufacturers
- Insurance companies
- Educational facilities
- Healthcare institutions
- Government agencies
- Large enterprises of any sort

ALMOST
4 OUT OF EVERY 5 JOBS LOST
from December 2007 to January 2010 belonged to workers with **NO FORMAL POSTSECONDARY EDUCATION.**[11]

CYBER SECURITY

Why pursue a career in cyber security?

Cyber security professionals, also known as information security analysts, are the people that stand between a company and cyber criminals, hackers and malware. They provide technical security controls, and dig deep into log files to determine what happened when attacks are detected and write scripts to protect against future attacks. They are always on the lookout for security vulnerabilities in target systems, networks and applications, making recommendations on where to beef up security and how to allocate security resources.

Cyber security professionals are charged with staying ahead of the latest attack methodologies, figuring out how attackers are breaking in and tracking them across systems. A skilled cyber security professional will learn to recognize malware indicators throughout the network to determine if systems have been breached. They must continually adapt and remain a step ahead of criminals who steal computer data and disrupt computer communications, staying current on the latest techniques attackers are using to infiltrate computer systems and IT security.

These professionals also need to actively research new security technology to decide what will most effectively protect their organization before any sort of breach occurs, often attending cyber security conferences and networking to hear firsthand accounts of other professionals who have experienced new types of attacks.

Cyber security professionals may also be responsible for creating an organization's business continuity and disaster recovery plan, a procedure that employees follow in case of emergency or attack. The plan helps an organization continue functioning and includes preventative measures such as regularly copying and transferring data to an offsite location and plans to restore proper IT functioning after a disaster. Good analysts continually test the steps in their recovery plans.

Because cyber security is important, analysts usually report directly to upper management. Many information security analysts work with an organization's chief technology officer (CTO) to design security or disaster recovery systems[12].

People who hold a degree in cyber security often pursue careers in:

- IT security research
- Security breaches monitoring and investigation
- Business continuity strategy and security
- Development of security standards and best practices
- Consulting for security enhancements to management or senior IT staff
- Installation and use of security software, such as firewalls and data encryption programs, to protect sensitive information

Who hires cyber security professionals?

Companies that capture, manage or store personal information, financial information, credit cards data, bank account information, consumer data or intellectual property are vulnerable to cybercrime. Because of this, employment of cyber security professionals or information security analysts is projected to grow 22 percent from 2010 to 2020, faster than the average for all occupations[12].

Demand for cyber security analysts is expected to be very high over the coming years. Cyber attacks have grown in frequency and sophistication, and many organizations are behind in their ability to detect these attacks. Analysts will be needed to develop innovative ways to prevent hackers from stealing critical information or creating chaos on computer networks.

The federal government is expected to greatly increase its hiring of information security analysts to protect the nation's critical IT systems. In addition, as the healthcare industry expands its use of electronic medical records, ensuring patients' privacy and protecting personal data are becoming more important. More information security analysts are likely to be needed to create the safeguards that will satisfy patients' concerns[12].

- Internet service providers (ISPs)
- Telecommunications companies
- Government agencies
- Homeland security
- Healthcare
- Education
- Large industry
- Large and global enterprises
- Banks and financial institutions
- Retail companies
- Online retailers

The National Security Agency (NSA) and the Department of Homeland Security (DHS) have designated National University as a "National Center of Academic Excellence in Information Assurance Education" through 2015[13].

DATA ANALYTICS

Why pursue a career in data analytics?

The term “big data” refers to the vast storehouse of data generated by businesses and individuals on a daily basis. This data needs to be stored, secured, categorized, managed, analyzed and made accessible. The people who manage big data are known as data analytic specialists, data analysts and or data scientists; their job is one that is highly valued and in great demand.

Data analysts gather, review and interpret data for a variety of industries, such as computer and hardware application development, manufacturing, healthcare and pharmaceutical research. Their job may include data entry, data auditing, creating data reports and monitoring data for accuracy. Deleting and creating data warehouses may be part of the job duties as well.

Data analysts also review and analyze data, seeking out meaningful patterns and trends and communicating that information to colleagues and clients. They are responsible for ensuring that the data within a company serves its needs and that data information is implemented properly and in line with corporate policies and procedures.

Data analysts must maintain a commitment to privacy and ethics. They must have good communication skills as they are often asked to discuss analytics with colleagues who may not have a complete understanding of the subject. They will also be expected to provide written reports to present their findings with colleagues and other people who don’t have the technical skill needed to interpret the data.

Students who earn a degree in data analytics may seek careers in:

- Business analyst
- Business process analyst
- IT Business analyst
- Requirements engineer
- Business systems analyst
- Systems analyst
- Data analyst
- Functional Architect
- Usability/UX analyst
- Data architect

Who hires data analytics professionals?

The U.S. Bureau of Labor Statistics (BLS) states that data communication analyst positions will increase 53 percent from 2008 to 2018[14].

The position of data analyst is highly sought after, with qualified candidates currently in short supply. The students who pursue a career in data analytics are likely to command handsome salaries in entry-level positions with earnings likely to increase as experience and skill levels grow. As big data grows exponentially, the need for effective data analytics will grow correspondingly.

Most systems data analysts specialize in certain types of computer systems that are specific to the organization they work with. For example, a data analyst might work predominantly with financial computer systems or engineering systems. Other specialties may include technologists, who write the algorithms and code to manage the data; statisticians and quantification experts; and artist-explorers, creative people who can navigate content and find something others don't see[15].

While data analytics professionals are in wide demand in tech companies, there is a wide range of employers that seek out employees with this degree, including:

- Colleges and universities
- Large enterprises
- Global corporations
- Technology companies
- Social media companies
- State and federal government
- Financial institutions

IN 1970
ONLY 26%
of middle-class workers
HAD EDUCATION
beyond high school.

TODAY
NEARLY 60%
OF ALL JOBS IN THE US
require higher education.[2]

DATABASE ADMINISTRATION

Why pursue a career in database administration?

Computer databases that store information are found in nearly every business and industry, with volumes of digital data that must be stored, organized, and managed. Database administrators, or DBAs, work with database software to find ways to do this by identifying user needs, setting up computer databases, and testing systems. They also ensure that systems perform as they should and add people to the system as needed. Database administrators often plan security measures, data integrity, backup, and security being critical parts of the job.

Database administrators use software to store and organize data, such as financial information and customer contact information. They identify user needs to create and administer databases and ensure the database operates efficiently and without error. They make sure that data are available to users and secure from unauthorized access. When needed, DBAs will modify and test the database structure while maintaining it and updating permissions. Sometimes DBAs will be asked to merge old databases into new ones and will be responsible for backing up and restoring the data to prevent data loss.

DBAs often work with an organization's management team to understand the company's data needs and to plan the goals of the database. Many databases contain personal or financial information, making security important. Database administrators are responsible for backing up systems in case of a power outage or other disaster. They also ensure the integrity of the database, guaranteeing that the data stored in it come from reliable sources[16].

People who hold a degree in database administration often pursue careers as:

- System database administrator
- Application database administrator
- Database manager
- Statistician
- Systems consultant
- Computer operator
- Technical support technician
- Computer science engineer
- Webmaster
- Computer service technician
- Database analyst
- Operations manager
- Systems manager
- Software engineer
- Systems analyst

Who hires database administration professionals?

Employment of database administrators is projected to grow 31 percent from 2010 to 2020, much faster than the average for all occupations[16]. Rapid growth in data collection by businesses, as well as increased need for database security measures, will contribute to the growth of this occupation[16]. Those having a college or graduate degree in computer science or a related field will have a good chance of getting a job.

With the passage of the Patient Protection and Affordable Care Act (PPACA), electronic medical records have become requisite, creating an expanding pool of fresh data. Because this growing pool of data must be managed, secured and made available to physicians and other medical professionals, database administrators are likely to be in high demand in the healthcare industry over the coming years.

Database administrators work in every sector of the economy with wide opportunities for self-employment. Employers of database administration graduates include:

- Government agencies
- Computer firms
- Computer and electronics manufacturers
- Online retailers
- Universities
- Computer science departments
- Financial institutions
- Internet service providers (ISPs)
- Web search portals
- Data-processing, hosting, and related services
- Insurance companies
- Hospitals
- Technology companies

NATIONAL UNIVERSITY

About National University

Since 1971, National University has been dedicated to making lifelong learning opportunities accessible, challenging, and relevant to a diverse student population. As a nonprofit institution, National University invests in its students by providing them with quality educational instruction and learning technologies, superior faculty, and exemplary student services.

National University has five schools and one college:

- School of Business and Management
- School of Education
- School of Engineering, Technology and Media
- School of Health and Human Services
- School of Professional Studies
- College of Letters and Sciences

Dedicated to educational access and academic excellence, National University provides challenging and relevant programs that are student-centered, success-oriented, and have a proven balance of theoretical and practical attributes.

National University offers the following technology degree programs:

- Bachelor of Science in Computer Science
- Bachelor of Science in Information Systems
- Bachelor of Science in Information Technology Management
- Master of Science in Computer Science
- Master of Science in Cyber Security and Information Assurance
- Master of Science in Data Analytics
- Master of Science in Management Information Systems
- Minor in Computer Science
- Minor in Information Technology Management
- Minor in Technology

Contact us to discuss your possibilities with a technology degree from National University:

- **Phone:** (800) NAT-UNIV (628-8648)
- **Email:** advisor@nu.edu
- **Visit us online:** http://www.nu.edu/OurPrograms/SchoolOfEngineeringAndTechnology/ComputerScienceAndInformationSystems.html

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