



GOVERNMENT OF BERMUDA

Department of ICT Policy and Innovation

# IT Career Guide 2019

**Cybersecurity:**  
Shaping the future of  
cyber defense in Bermuda



## Inside Features

- 3 IT Scholarships
- 6 Healthy Cellphone Habits
- 10 Technology Solutions to Environmental Problems at BIOS
- 15 Skills Companies are Looking for



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Cybersecurity: Shaping the future of cyber defense in Bermuda

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Electronic invoices led by Miaocai Network.

**ENERGY**

Chile's National Energy Commission is using blockchain to track tax records and electricity invoices led by Miaocai Network.

Chile's National Energy Commission has started using blockchain technology as a way of verifying data pertaining to the country's energy usage as it seeks to update its electrical infrastructure.

**RAILWAYS**

Russian rail operator Novotrans is storing inventory data on a blockchain pertaining to repair requests and rolling stock.

**DIAMONDS**

The De Beers Group is using blockchain to track the importation and sale of diamonds.

## 50+ BLOCKCHAIN REAL WORLD USE CASES

The infographic is a world map with 50+ location pins, each pointing to a specific use case. The use cases are categorized by industry and include the following examples:

- GOVERNMENT:** Essentia develops world's first blockchain solution to manage international business hub together with Traffic Labs and the Finnish Government.
- IDENTIFICATION:** Voter registration is being facilitated via a blockchain project in Switzerland spearheaded by Uport.
- MOBILE PAYMENTS:** The blockchain ledger Fuel Rights used by a group of Japanese banks, who will be using it for quick mobile payments (Ripple).
- INSURANCE:** A smart contract based blockchain is being used by major American International Group Inc as a means of saving costs and increasing transparency (AIG).
- ENGAGED SPECIES PROTECTION:** The protection of endangered species is being facilitated via a blockchain project that records the activities of these rare animals.
- CARBON OFFSETS:** IBM is using the Hyperledger Fabric blockchain in China to monitor carbon offset trading (IBM).
- ENTERPRISE:** Ethereum's blockchain can be accessed as a cloud based service courtesy of Microsoft Azure.
- BORDER CONTROL:** Essentia has devised a border control system that would use blockchain to store passenger data in the Netherlands (essentia.one).
- SUPPLY CHAINS:** IBM and Walmart have partnered in China to create a blockchain project that will ensure food safety (IBM, Walmart).
- HEALTHCARE:** A number of health-care systems that store data on the blockchain have been pioneered, including Medibao.
- SHIPPING:** Shipping is a natural fit for blockchain, and Maersk have been tracking a blockchain based project within the maritime logistics industry (MAERSK).
- REAL ESTATE:** Blockchain is now being used to complete real estate deals, the first of which was conducted in Kiev by Propy.
- ENERGY:** Essentia is developing a test project that will help energy suppliers track the distribution of their resources in real time, while maintaining data confidentiality (essentia.one).
- LAND REGISTRY:** Land registry titles are now being stored on the blockchain in Georgia as a project developed by the National Agency of Public Registry.
- COMPUTATION:** Digital Currency Group is funding American Visa Services examine ways it which the distributed ledger technology can help improve database security (DIGITAL CURRENCY GROUP).
- ADVERTISING:** New York Interactive Advertising Exchange has been experimenting with blockchain as a means of providing an ads marketplace for publishers (NYIAX).
- JOURNALISM:** Decentralized journals are enabled by blockchain technology, has the potential to prevent censorship and increase transparency as Civil has shown.
- WASTE MANAGEMENT:** Walpole team is using RFID technology to store waste management data on the blockchain in China.
- ENERGY:** Food Impression is another industry where blockchain is proving to work with Leda Dryfus Co tracking a customer reputation program using this technology (LDC).
- DIAMONDS:** The De Beers Group is using blockchain to track the importation and sale of diamonds (De Beers).
- FINE ART:** By storing certificates of authenticity on the blockchain, it's possible to digitally verify art. Argentina, as one blockchain project is proving.
- NATIONAL SECURITY:** For the past two years, the US Department of Homeland Security has been using blockchain to detect and verify threat data captured from its security cameras.
- TOURISM:** In a bid to detect tourism inhibitors, Hawaii is exploring ways in which blockchain-based applications can be adopted throughout the US state.
- TAXATION:** In China, a tax-based initiative is using blockchain to track tax records and electricity invoices led by Miaocai Network.
- ENERGY:** Chile's National Energy Commission has started using blockchain technology as a way of verifying data pertaining to the country's energy usage as it seeks to update its electrical infrastructure (CNE).
- RAILWAYS:** Russian rail operator Novotrans is storing inventory data on a blockchain pertaining to repair requests and rolling stock (ROBOTPAHC).
- ENTERPRISE:** Google is building its own blockchain which will be integrated into its cloud-based services enabling businesses to store data on it, and to request their own white label version developed by Alphabet Inc (Google, Alphabet).
- MUSIC:** Arbit is a blockchain based project led by former Guns N' Roses drummer Matt Sorum seeking a fairer way to reward musicians for their creative efforts (arbit).
- FISHING:** Blockchain technology has been used to provide a transparent record of where fish was caught, as a means of ensuring it was legally fished.

MATTEO GIANPIETRO ZAGO



## Letter from the Premier of Bermuda

The Hon. David Burt, JP, MP  
Premier of Bermuda

Dear Readers,

The Government of Bermuda knows how important technology is. Whether it's in hospitality, transportation, telecommunications, or infrastructure, there is no under-estimating the impact that technology has had on Bermuda. And as it develops, technology will continue to influence our Island to a significant extent.

That is why the Government consistently promotes initiatives that encourage innovation through technology, e-skills development and e-entrepreneurship.

We are seeing more and more Bermudians embracing technology and building businesses utilising the latest technologies. For students seeking a career in the field of Information and Communications Technologies (ICT), this guide is a useful tool and reference book. In fun and succinct fashion, it provides the reader with an overview of ICT-related careers and learning opportunities, tips and useful tech-related information.

As you prepare to pursue your goals, your visions, dreams and hopes, use this guide to decide what you want for your future and how you can achieve it.

I wish you all the best.



## Letter from the Minister of National Security

The Hon. Wayne Caines, JP, MP  
Minister of National Security

### **Welcome to the 2019 IT Career Guide, the Cybersecurity Edition.**

Dear Readers,

In this issue of the IT Career Guide, you will find a list of highly-rated universities and programmes worldwide that focus on the Information and Communication technologies (ICT). You will read profiles of successful local IT professionals and look through an index of local IT scholarships available to you. You will also see articles that aim to help you identify an IT specialisation and enhance your employability in the field of ICT.

As you know, technology has become an underlying foundation for every area of society, whether we see it or not. It has created an unprecedented number of job opportunities globally and a diverse palette of possible career paths, locally.

This Guide also aims to educate you on some of the different job opportunities available in Bermuda and the necessary skills and qualifications that will enable you to have a successful information technology career.

However, increasing technological integration means more targets for cybercrimes. So, this Guide contains security tips and details of devices that will help you to keep your personal information safe, including an outline of various international cybersecurity standards. These cybersecurity standards will give you a better understanding of the pressing issues of cybersecurity, how to anticipate them, how to tackle them, and how to keep your information safe.

The need for IT professionals, particularly in cybersecurity, will only continue to increase. Whether you study cybersecurity and choose to work in Bermuda or overseas, we hope that the information contained in this Guide is helpful to you.

We want Bermudians to have a head-start on the competition. Use the IT Career Guide as a valuable resource. It will help you as you prepare for a bright future in IT.



## Letter from the Minister of Education

The Hon. Diallo Rabain, JP, MP  
Minister of Education

Dear Readers,

As our world becomes increasingly digital, education around Information, Communication and Technology (ICT) is more important than ever before.

Every website, smartphone app, computer program, calculator, even something as commonplace as a microwave relies on ICT. One thing that all of these technologies have in common is coding. Coders and ICT professionals are the architects of the digital age.

Over the next 10 years, it is estimated that there will be 14 million jobs in computer science and only around 400,000 graduates qualified to fill them.

This is why it is critical to be proactive and expand opportunities surrounding these new technologies to traditional and continuing education students here in Bermuda.

The Ministry of Education is working hard to introduce coding as early as possible through various programmes in Bermuda Public Schools and at the Bermuda College. Through the Department of Education's partnership with Connectech and Hamilton Insurance Group, the Primary School Coding Program is thriving. We are building Bermuda's future computer engineers starting from Primary School. Investing in the digital literacy of our children is not only needed; it is required for us to build a viable future workforce.

As the Minister of Education, I am always willing to do what is necessary to ensure our children and young adults are given every opportunity to succeed. I am especially proud of the current Coding BootCamp that is taking place at the Bermuda College. This opportunity for students', young and old alike, to experience and upgrade their skills with coding helps to cover the full spectrum from primary school to older adults looking to update their skillsets.

Our future generations will use coding like my generation used words. We owe it to them to ensure that they are given every opportunity to realise their potential. Employment in the digital sector will only continue grow, and we are doing everything necessary to ensure that we have trained Bermudians ready to assume these roles.

I encourage you to take advantage of this publication to explore opportunities to become an active contributor to this rapidly evolving, digital society in which we live.

Bermuda is leading the way, and no one will be left behind. Be bold, be adventurous and most of all, be willing to adapt to this new technology.

# Scholarships

By Caroline Caton

Studying IT can be expensive. Luckily there are many scholarships for Bermudian students, whether it is for an associate, undergraduate or post graduate degree. Most of these scholarships are IT specific and some are not limited to one area of focus.

**Below is information that should help you in your search.  
Our advice is that you start applying early, well before the published deadlines.**

Scholarship Name	Amount	Deadline
<b>Associate</b>		
BELCO C. Eugene Cox Post Graduate STEM Scholarship	\$25,000	31 May
Bermuda College Sir William Stephenson Entry	\$4,400	31 May
Bermuda College STARR Foundation Entry Scholarship	Cost of tuition and fees	31 May
BFIS Bermuda College Scholarship	\$3,500	30 June
Department of Workforce Development Local Training Award	up to \$5,000	31 May
Department of Workforce Development National Technical Vocational Training Award (NTVT)	up to \$10,000	31 May
PartnerRe Undergraduate Scholarship Award	\$25,000	31 May
<b>Undergraduate</b>		
ABIC Education Awards	\$15,000	7 April
BFIS Undergraduate Scholarships	\$25,000	30 April
BTC Sir John W. Cox Career Award	\$20,000	31 May
Department of Workforce Development Local Training Award	up to \$5,000	31 May
Department of Workforce Development National Technical Vocational Training Award (NTVT)	up to \$10,000	31 May
Ewan Sampson Scholarship Trust	\$12,500	31 May
Green Family Scholarship	\$5,000	3 August
Nicholls Scholarships	\$25,000	9 June
PartnerRe Undergraduate Scholarship Award	\$25,000	31 May
RenaissanceRe Undergraduate Scholarship	\$25,000	7 April
The Digicel Bermuda Scholarship	\$5,000	7 August
Validus Scholarship	\$20,000	28 April
<b>Post Graduate</b>		
ABIC Education Awards - Post Graduate Scholarship	\$20,000	7 April
St. John's IT Scholarship	\$10,000	30 June
<b>Other</b>		
Bank of Bermuda Foundation Information Technology Scholarship	\$12,000 annually	31 March
St. John's IT Scholarship	\$10,000	30 June

# Rankings of Computer Science Universities

There are many computer science programmes around the world, though Bermudian students mainly go to universities in the US, UK and Canada. The universities in Canada and the UK are regulated, so there is consistency throughout their programmes; the US is self-regulated, so consistency is not as prevalent.

Below are the various rankings for each country.

**Canada** 

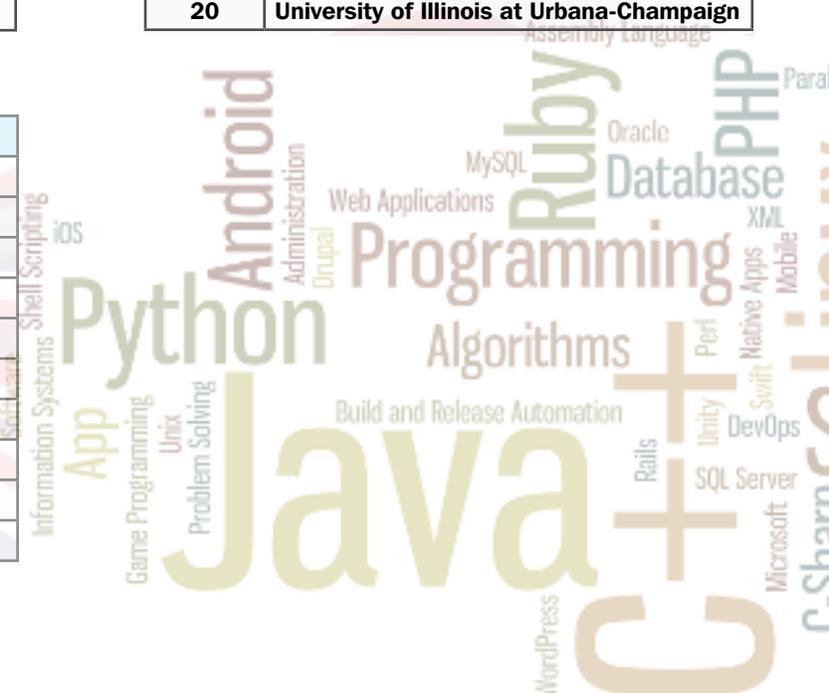
Ranking	University
1	University of Toronto (UofT)
2	University of British Columbia (UBC) University of Waterloo
4	University of Alberta
5	McGill University
6	Simon Fraser University
7	Universite de Montreal
8	Queen's University
9	University of Calgary
10	University of Ontario Institute of Technology (UOIT)
11	University of Victoria
12	University of Manitoba University of Ottawa
14	Concordia University McMaster University St. Francis Xavier University
17	Saint Mary's University University of Saskatchewan York University
20	Western University

**US** 

Ranking	University
1	Massachusetts Institute of Technology (MIT)
2	California Institute of Technology
3	Stanford University
4	Carnegie Mellon University
5	Georgia Institute of Technology
6	University of California at Berkeley (UCB)
7	Princeton University
8	Cornell University
9	Harvard University
10	Duke University
11	University of Michigan at Ann Arbor
12	Rensselaer Polytechnic Institute
13	Johns Hopkins University
14	Columbia University
15	Yale University
16	University of Pennsylvania
17	Harvey Mudd College
18	Rice University
19	Northwestern University
20	University of Illinois at Urbana-Champaign

**UK** 

Ranking	University
1	Oxford University (UK)
2	University of Cambridge
3	Imperial College of London
4	Durham
5	St. Andrews
6	University College of London
7	Warwick
8	University of Bristol
9	Manchester
10	Bath



# IT University Course Specialisations

While Computer Science is a crucial degree for IT, other programmes and degrees do focus on one area of IT rather than keeping an overall focus. Everything from cybersecurity to artificial intelligence (AI) incorporates elements of computer science. The programmes listed below allow you to hone your focus in technology while providing you with the necessary foundational skills.

UK



Computer Science and Information Systems	
Ranking	University
1	St. Andrews
2	University of Cambridge
3	Oxford
4	Imperial College of London
5	Swansea
6	Loughborough
7	Edinburgh
8	Manchester
9	Aston
10	Southampton

Engineering and Technology	
Ranking	University
1	University of Cambridge
2	Imperial College of London
3	Oxford
4	Manchester
5	University College London (UCL)
6	Edinburgh
7	Nottingham
8	Leeds
9	Southampton
10	Bristol

US



Computer Systems	
Ranking	University
1	University of California – Berkeley
2	Massachusetts Institute of Technology (MIT)
3	Stanford University
4	Carnegie Mellon University
5	University of Washington
6	Georgia Institute of Technology
7	University of Illinois – Urbana-Champaign
8	University of Texas – Austin
9	University of Wisconsin – Madison
10	University of Michigan – Ann Arbor

Cybersecurity	
Ranking	University
1	Carnegie Mellon University
2	Florida Atlantic University
3	George Mason University
4	Georgia Institute of Technology
5	University of Maryland
6	Massachusetts Institute of Technology (MIT)
7	Purdue University
8	Rochester Institute of Technology
9	University of Massachusetts – Amherst
10	University of Washington

E-commerce/E-business	
Ranking	University
1	Kaplan University
2	Full Sail University
3	Xavier University
4	Walden University
5	University of North Carolina
6	Seattle University
7	McKinley College
8	Clarkson University
9	DePaul University
10	Western Michigan University

Artificial Intelligence	
Ranking	University
1	Stanford University
2	Carnegie Mellon
3	MIT
4	UC Berkeley
5	University of Washington
6	Georgia Tech
7	University of Illinois – U-C
8	University of Texas – Austin
9	Cornell
10	UCLA

# International Computer Science Programmes

Computer science is a growing field of expertise that creates opportunities worldwide. With so many programmes to choose from, look for the option that provides you with the skills and education that you want.

Below are the top 25 global computer science programmes, some of which can expand your education options outside of the US, UK and Canada.

Computer Science		
Ranking	University	Location
1	Massachusetts Institute of Technology (MIT)	US
2	Stanford University	US
3	University of Oxford	UK
4	Harvard University	US
5	Carnegie Mellon University	US
6	University of Cambridge	UK
7	University of California - Berkeley (UCB)	US
8	ETH Zurich - Swiss Federal Institute of Technology	Switzerland
9	National University of Singapore (NUS)	Singapore
10	Princeton University	US
11	University of Toronto	Canada
12	Imperial College of London	UK
13	University of Melbourne	Australia
14	Nanyang Technological University (NTU)	Singapore
15	Hong Kong University of Science and Technology	Hong Kong
16	University of California - Los Angeles (UCLA)	US
17	Tsinghua University	China
18	Ecole Polytechnique Federale de Lausanne (EPFL)	Switzerland
19	University of Hong Kong	Hong Kong
20	University of Edinburgh	UK
21	University of Tokyo	Japan
22	Chinese University of Hong Kong (CUHK)	Hong Kong
23	Peking University	China
24	University of British Columbia	Canada
25	Georgia Institute of Technology	US

## Healthy Habits to Develop as you Use Data on your Mobile Device

- Before travelling ensure that data roaming is turned off - otherwise the monthly mobile invoice will be very high.
- Turn off cellular/mobile data usage for applications that you do not require at the time.
- Ensure the settings within applications like Dropbox are set to WiFi.
- Disable the function “background application refresh”.
- On iPhones, turn off the “WiFi Assist” function.
- Use WiFi - but ensure you are in a protected WiFi environment, especially if you have incoming/outgoing emails that contain important information.
- Use Twitter Lite to limit the data usage.

# Profiles of IT Professionals

For this segment, we profiled two IT Professionals from the private and public sector, to get a better understanding of what employers are looking for in future employees and of how you can best enhance your chances in the IT industry.

## Stuart Daniels

Government of Bermuda, Security Manager  
Information Digital Technologies



**Educational Background** BSc in Computer Science and a BA in Psychology and Sociology with distinction.

**Number of years in the industry**  
20 years.

**What led you into a career in technology?** When I was running my own business I created a small database

application for quoting and invoicing. It really made my job easier and creating something useful gave me a great deal of satisfaction and a sense of accomplishment. I decided to go back to school for a second degree to become a database developer.

**Who has influenced your career?** My former high school math teacher started a computer business and gave me my first job in IT.

**What has been your favorite career moment?** I once received an award from my employer in recognition of my work. I was able to take a group of friends out for a nice dinner and my employer paid the bill.

**What's the best decision you've made or career move/project you've been involved in?** My favorite project was developing a risk management programme for a reinsurance company. The client said that it exceeded their expectations and greatly improved their ability to manage and communicate risks.

**And the biggest mistake?** I used to focus too much on just the technology. Good security needs to focus on people and processes in addition to the technology.

**How do you stay current on industry developments?**  
I read all I can and ask other professionals for their advice.

**How do you think the industry will look 10 years from now?** I think it will be essential for IT and security professionals to have a combination of technical understanding and business/management skills.

**What advice would you give young Bermudians considering a degree in ICT? (Skills/courses etc.)** Look for a programme that will give you a broad education including technical, business and people skills.

**What are the most useful certifications for aspiring or current cybersecurity professionals?**

- Certified Information Systems Security Management Professional (CISSP-ISSMP).
- Certified Secure Software Lifecycle Professional (CSSLP).

**Which particular areas within IT and cybersecurity have you seen develop that you think students should focus on?**

- There is a shortage of professionals with secure systems development skills.
- There's also a need for professionals with security operations center skills such as monitoring, analysis and incident response.

## Stuart Lacey

Trunomi, Founder and CEO



**Educational Background**

BSc Economics and Political Science – McGill University.

**Number of years in the industry**  
15 years Financial, 5 years Tech.

**What led you into a career in technology?** Combination of Fin + Tech and a huge need, plus a moment of

inspiration led to the founding of Trunomi.

**Who has influenced your career?**

- My 2 main mentors (both 10 yrs my senior and advising me for over 2 decades).
- Inspiring people (Richard Branson and Elon Musk for example).

**What has been your favorite career moment?** Conducting my TEDx talk on the Future of Data Privacy, here in Bermuda <https://www.youtube.com/watch?v=Jlo-V0beaBw>.

**What's the best decision you've made or career move/project you've been involved in?**

- To always honour my resolve to be an entrepreneur and trust in myself that I can achieve anything I put my mind to
- The choice in 2012 to close and sell off my interests in my prior financial company of 10 years SHL Capital (which I also founded) and start Trunomi.

**And the worst?** To try and merge SHL Capital with a larger group – and then suffer from all the issues relating to having “too many chefs in one kitchen,” and surrendering constructive control and accountability to my vision for my company.

**How do you stay current on industry developments?**

- Read everything reliable that I can get my hands on (Harvard Business Review, The Economist, and any real and not “fake” news websites).
- Follow on Twitter key strategic thinkers and industry/thought leaders and then read what they like.
- Watch a lot of TED talks.
- Attended Singularity University in 2013.
- Listen (because you learn nothing when you are talking).

**How do you think the industry will look 10 years from now?**

- My personal view: Artificial Intelligence (AI) will be integrated into everything we do, matched with Machine Learning and NLP to enable voice control of everything, and mind-linked AI for special tasks. Personal data has become the world's largest asset class and is run via permissions based-access on distributed immutable ledgers, thereby reducing governmental influences from individuals' lives where all individuals own their own sovereign identity, access controls and data – linked on a distributed network with federated access and AI-enabled management. The 5 biggest GAFAM companies (Google, Alphabet, Facebook, Amazon, and Microsoft) are no longer in the top 10 and have been replaced with names we currently don't recognize (except Tesla – which will be there).

# Profiles of IT Professionals

continued

- b. My prescription for you: Take a pill of your most optimistic view of today, multiply by 200% Sci-Fi inspiration, mix with 2 black swans (total surprise events) and then check yourself every week to learn from all the failures, pivot as needed and readjust your trajectory to accommodate.

## What advice would you give young Bermudians considering a degree in the field of technology? (Skills/courses etc.)

- b. If you are a young girl, check out “Girls who Code” and know that the glass ceiling will not be your limiting factor. Rather, what will matter will be your skills to navigate this ceiling and your resolve to break through it.
- b. Stick with tech and focus on AI, ML and NLP. Dozens of job descriptions will be replaced by these 3. So ensure you are on the right side of this change.
- c. Understand what BitCoin and Ethereum really are and learn to use Distributed Ledgers in applications and daily-use cases.
- d. Remember your future will be determined at least 50% by who you know and how you deal with people, as much as what you know. Invest in others, lead by example, take the stage, use your voice.

## What qualifications, skills or expertise are you looking for from potential employees? I

have always believed that only 2 things cannot be taught: passion and work ethic. Everything else can be developed and mentored. As such, I recruit with a very heavy focus on these 2 key prerequisites.

## What are the biggest opportunities and challenges facing your company currently?

Being an industry leader and creating a new market is incredibly tough. It has taken 5 years of patience and determination – now the movement is finally building. Our issue will be to get on the first and largest wave and surf it as long and as far as we can into shore.

# Cybersecurity Standards

As the world becomes increasingly integrated with technology, new cybersecurity standards, both regional and international, are developed to fortify information security. These help to establish norms and best practices within society so that information is protected.

If companies and organizations adopt these standards, they can become internationally recognized as compliant with cybersecurity standards. This can help develop our international business industry, as both countries and companies want to know that their personal and private information is being protected.

If the Island does not comply, we risk our international reputation and, thus, at the very least, our international business sector.

## Regional Standards CyberEssentials (UK) : There are five major categories to help guide companies with securing their information.

### 1. Boundary Firewalls and Internet Gateways

Users should deploy strong passwords [8 characters minimum] and each network rule should be documented and updated whenever there are network changes.

### 2. Secure Configuration

Remove unnecessary accounts and enable personal firewalls on devices to configure a default that blocks unapproved connections.

### 3. Access Control

Approve and appoint all user accounts and restrict certain privileges to authorized users. Accounts should be deleted/disabled when they are no longer needed.

### 4. Malware Protection

Install up-to-date malware protection software on all network devices that scan files regularly and prevent connections to malicious websites.

### 5. Patch Management

All software is licensed, ensuring that security patches are available and installed within a reasonable amount of time (2 weeks within release date).

## NIST (US): This is a more complex method, where they have five major categories, each with various subcategories.

### 1. Identify

- Assets vital to the organization are managed relative to objectives and risk strategy.
- Objectives inform cybersecurity roles and risk management decisions.
- Policies, procedures and processes inform cybersecurity risk management.
- Consider cybersecurity risks to company operations, assets and individuals.
- Priorities and risk tolerances are established and support operational risk decisions.

### 2. Protect

- Access to assets is limited to authorized users, devices, processes and activities.
- Personnel are trained to perform security duties consistent with policies.
- Information is managed according to the risk strategy, maintaining confidentiality.
- Procedures are used to manage protection of information assets and systems.

- Repair and maintenance of system components is consistent with policies.
- Solutions ensure security and resilience of assets and systems, according to policies.

### 3. Detect

- Anomalous activity is detected and its impact is understood.
- Assets are monitored in discrete intervals to identify events and value of measures.
- Processes are maintained and tested to ensure an adequate awareness of events.

### 4. Respond

- Response procedures are executed and maintained, ensuring timely detection of events.
- Activities are coordinated internally and externally to include law enforcement.
- Analysis is performed to ensure adequate response and recovery.
- Activities help prevent expansion, mitigate effects and eradicate incident.
- Activities are improved and influenced by previous experiences.

### 5. Recover

- Recovery processes ensure timely restoration of assets affected by the events.
- Planning is improved by incorporating lessons learned from previous events.
- Restoration activities are coordinated internally and externally with various actors.

## International Standard ISO 27001: This is the most commonly-used and acknowledged standard as most governments and international corporations use ISO for their cybersecurity programme.

- Avoid penalties/financial losses due to data breaches
- Meet increasing client demands for data security
- Protect/ Enhance reputation
- Independently audited proof that data is secure
- Meet global/ local security laws, e.g. GDPR (General Data Protection Regulation)

## Implementation

- Get board commitment (budget)
- Develop internal competence
- Scope/ Risk assessment
- Management system documentation
- Training
- Measure/ Monitor/ Review the Information Security Management System (ISMS)
- Review/implement required controls
- Certification

# Technology Solutions to Environmental Problems at BIOS

The spread of plastic debris and its persistence in the environment is a global issue. Plastics impact virtually every aspect of the marine environment, from shorelines and beaches all the way to the deepest trenches of the ocean. Marine plastics are carried by ocean currents to the most remote areas of open ocean. Plastics also threaten many species of marine animals, which ingest small particles or become entangled in nets and lines that take many years to degrade.

With this global problem in mind, researcher Matt Hayden at the Bermuda Institute of Ocean Sciences (BIOS) took a look at ways of reusing plastics found washed up on Bermuda's beaches. This summer, Matt, along with Bermuda Program students Jacari Renfroe and Hamish McNiven, investigated the possibility of creating a machine that could recycle beach plastic into a solar-powered cellphone case. Based on open source plans from Dave Hakkens (Precious Plastics), the team assembled a plastics injection machine from locally sourced parts.

The plastics injection machine comprises four bands that heat the instrument to 250°F for approximately 30 minutes, during which time the plastic was first melted, then forced via a lever into a mold. Once the plastic had cooled, the internal wiring sections of the cellphone charger were assembled using parts sourced from Kitables.

The mold itself was designed using SolidWorks CAD programming and cut out using a CNC machine, which uses a coordinate system to convert the computer design to a 3D structure. Executing the mold to the specifications of the CAD drawing is a trial and error process.

Renfroe and McNiven conducted this research as part of the Bermuda Program, an 8-week summer internship opportunity at BIOS for Bermudian students. In operation since 1976, and having served over 150 local students, the program seeks to provide work experience to broaden student knowledge of marine and atmospheric sciences. For more information about the program please visit <http://bios.edu/education/bermuda-student-programs/>.

This project is a demonstration of how teamwork and ingenuity combine to help tackle environmental problems with technology. "The ultimate goal of the project is to find innovative ways to clean Bermuda's coastline," said Hayden. "By bringing together various experts, such as citizen scientists, computer programmers, mechanical engineers, and product designers, we were able to tap into existing knowledge resources and develop an innovative solution to the problem of marine plastics." To find out more about the project please visit <https://preciousplastic.com> or contact [matthew.hayden@bios.edu](mailto:matthew.hayden@bios.edu).

By: Kaitlin Noyes, Matt Hayden and Jacari Renfroe



*CNC machine mold created with SolidWorks*



*Jacari Renfroe (right) and Hamish McNiven (left), Bermuda Program interns at CNC machine*



*Fully assembled prototype of solar powered cellphone charging case from recycled plastics.*



*Plastics injection set-up and design with image on right from Precious Plastics open source design*

# Securing Devices/ The Internet of Things

## Recommended Firewalls for Smart Homes and Devices

- **Cujo (\$250 with lifetime subscription or \$100 with \$9 monthly subscription fee)** “Plug-and-play” firewall that acts like a bridge between devices and the Internet connection. It connects to your router and has an app that lets you monitor activity on your network. The app also produces alerts when it blocks a threat and updates in real-time any new threats. You can also decide to unblock a device.
- **RATtrap (\$230)** Intrusion detection and prevention, updates and behavior modeling. This does not require a manual setup: you just have to connect to a router and modem. The device has an associated app and web portal so you can access data about the threats your device is blocking. However, it's not necessary for you to use them as the device works automatically.
- **Dojo (\$200 with one-year subscription to cloud service [renew for \$10/month or \$99/year])** The device sends notifications/warnings through an app, uses colored lights to indicate whether or not there is a threat [white=safe, red=threat]. Automatically discovers/profiles devices, and creates a tailored security policy for each device with constant monitoring of both internal and external attacks. A cloud-based engine analyzes data from every device and produces algorithms to detect security and privacy breaches. A dynamic policy updates each Dojo device with the latest threats.

## Best Security Apps



### Android

- **Ghostery Browser (Free)** Shows you trackers and ad networks employed by websites and gives you the option to turn them off. Allows you to browse the web in privacy.
- **LastPass (Free/\$12 per year)** This password manager allows you store all your passwords, PINS and other information while hiding it behind a master password. A LastPass Authenticator provides additional security. The free version gives you most of the features.
- **Reslio Sync (Free)** Create your own cloud storage where the computer version turns your computer into a cloud storage server. You use the app to access your files [e.g. Google Drive/Dropbox] but you know where the files are stored. There are no storage limits either.
- **Tor Project – Free (3 apps)**
  - Tor directs Internet traffic through a free, worldwide, volunteer overlay network to conceal the user's location from network surveillance/traffic analysis. Protects personal privacy of users and allows them to have confidential communication. Some websites limit Tor users' abilities (e.g. limited edits on Wikipedia).
  - Orbot** (proxy app) – helps other apps use Tor's technology for anonymity
  - Orfox** (beta mode for app) – Browser uses the network once opened. Once the session ends, privacy-sensitive data [http cookies and history] are deleted.
  - ITorChat** (messenger) – cross-platform app that sends all messages over the Tor network.

### Apple

- **1Password (Free)** Stores sensitive information and passwords but will also generate strong/unique passwords. [Uses AES 256-bit encryption]
- **Keely (Free)** Stores private data (PINs, credit cards etc.) and has a fake pin feature: an alternate password that the user can give to others so when they enter the app it looks empty.

- **Lock It Up! (\$0.79)** Lock a PC/Mac from anywhere using an iPhone (through the cloud).
- **Mynigma (Free)** Automatic end-to-end encryption for email, directly on your device, not in the cloud. [Cross-platform]
- **Wire (Free)** Secure messaging app that offers encrypted live audio/visual group calling. You use different keys for each device; it sends a unique keycode for every different login.

### Cross-platform

- **360 Mobile Security (Free)** Scans installed apps and content automatically for viruses/adware etc. Deletes junk files (caches), has privacy and app lock (for social media accounts) and an anti-theft feature.
- **Avast Mobile Security (Free)** has real-time malware blocking, manual malware scanning, phishing protection, app permissions etc.
- **Linphone (Free)** make HD calls (audio/video) using secure end-to-end VoIP. Engine and protocol are open source and can also send text messages, photos and files with the protocol.
- **Telegram (Free)** Alternative to WhatsApp that encrypts all messages, allows you to apply self-destruct timers and have up to 5,000 users in group chats. All messages are stored on the cloud (sync across devices).
- **CM Security AppLock (Free)** lock features like mobile data, Wi-Fi, Bluetooth and specific apps so that they are inaccessible without the correct PIN. Failed attempts leads to a photo of the intruder along with an email alert.



Marbleized plastic cell phone charger cover produced from CNC mold

# A day in the life of a cybersecurity student: **Caroline Caton**

I am a third-year student studying Networking and IT Security at the University of Ontario Institute of Technology. This was a day during my second year. My schedule changes daily and each semester, but this is the longest day in my schedule and has almost all of my classes in it.



**6:00am** – I wake up and go to the gym! I find it a lot easier to work out in the morning than to try to force myself to do it later in the day; it also gives me a good boost of energy for the day.

**7:15am** – Shower, get ready, eat breakfast, make coffee. I can't be very productive before I eat and drink something. Then, I go over my notes from the previous day or lecture, make sure I'm prepared for my first lecture.

I then work on some assignments. If there are no assignments, I go over any areas I need help on in my classes. For that, I look on Khan Academy and elsewhere online if the information I need is not directly in the slides or textbook. Remember: you want to use more than one resource to make sure you fully understand the material.

**9:20am** – Start heading to class. I live on campus but it takes 10 minutes to get to the hall, plus it's nice to get there a bit early and get a good seat.

**9:40am** – First lecture of the day. Today it's Web and Script Programming. I follow along with the professor's slides and make notes on things I want to either research more or practice. We go over some examples that are useful for the current assignment that I'm working on.

**11:00am** – Time to go to a quiet room with friends and study some more. My group and I work on some assignments such as our latest programming assignment, and try to help each other understand any topics we're confused on.

**12:00pm** – Go back home and eat some lunch before class.

**12:40pm** – Second lecture: Introduction to Project Management. I take some notes on the professor's slides.

**2:10pm** – Advanced Networking lab. We get 3 hours during which we are to complete a series of assignments with our lab partner and show the results to the Teacher's Assistant (TA). If we're lucky, we get to leave the lab early. Today, we got to leave at 4 p.m. so I went home to study and continue working on my programming assignment.

**5:30pm** – Have dinner, catch up with my roommates and relax for a bit. I go over my notes for my last lecture after I eat.

**6:40pm** – Last lecture, Accounting for IT. It's 3 hours long but it's the only time in the week that I have the class. That means taking a lot of notes, as our professor has to cram everything into one lecture. It's a bit tiring but not too bad.

**10:00pm** – Get home, get ready for bed and look over my notes for the day. I add anything I feel is necessary and make sure that I highlight any areas that are important (for easy reference in case of exams or assignments).

**11:00pm to 6:00am** – Bedtime. I get up at 6 a.m. regardless of when my classes start. It's so much easier to have a routine!!



## Best Practices to secure IoT devices

- **Don't connect devices unless it's necessary**  
To determine whether or not you need to connect the device to the Internet and what that entails (e.g. what information is shared and where is it stored?)
- **Create a separate network** Have a guest network so visitors cannot directly access your files. This helps maintain security for devices that don't have a built-in security feature.
- **Pick good passwords and a different password for every device** Use a password manager to keep track of all your device passwords. Different passwords limit the access that a hacker can have to your network.
- **Turn off Universal Plug and Play (UPnP)**  
Hackers can find your devices through the protocol and attack without connecting to your network, shutting off the feature limits this type of attack.
- **Don't connect devices unless it's necessary**  
Determine whether you need to connect the device to the Internet and what that entails (e.g. what information is shared and where is it stored?)
- **Make sure you have the latest firmware installed** Implement security patches/updates when they are released; you can automate this process or check for updates periodically. They fix vulnerabilities and protect your devices from attacks.
- **Be careful when selecting cloud services**  
Pick/use a cloud service that encrypts your data so that there is less of a risk of your information being hacked. Cloud servers only work when your network is up as well, so look for servers that are more consistent and reliable.
- **Don't bring personal IoT devices to the workplace** This exposes your devices to potential attacks, dependant on how accessible the network is (are there multiple networks [guest and employee]? Is a password required?)
- **Track and consistently assess devices**  
Look at the protocols that your devices use, their updates, and privacy policies and, thus, how much network access should they be given? Determine which device stores the most personal information and which is most likely to expose that information to a hacker.

# BHS Techies Take Centre Stage at the FIRST Global Challenge



In the summer of 2017, five BHS girls, with only one month's notice and one robotics kit, proudly represented Bermuda at the FIRST Global 2017 Robotics competition in Washington DC. The team finished ahead of the United States, Canada, Russia and Great Britain and was one of only six all-girls teams in the competition - ending the competition as the top female team.

The 2017 FIRST Global challenge, in its inaugural year, addressed the global issue of access to clean water by building a model river and having the teams race to clear it of contaminants using their robots to accomplish this goal. More than one billion people do not have access to clean water and over half of them are children.

In each round of the competition, three teams worked together to remove as many contaminants from the river as possible, as another alliance of three teams sought to do the same thing on the other side of the river. Contamination was simulated with a constant stream of plastic balls, blue being clean water and orange being contaminants.

**Team Bermuda consisted of Yulia Isaeva '19, the captain and driver, Katie Grainge '20, coder and driver, Ashlyn Lee '20, spokesperson and tactician, Kameron Young '19, coder and back-up driver and Nadhiri Simons-Worrell '20, back-up driver.**

The team overcame many challenges such as creating a robot from scratch and only having one month to do so, when most teams had 6 months. However, through a combination of hard work, commitment and perseverance, they pulled through and created a robot that met the competition's challenge.

“Each of the team members brought their own special abilities which enabled the improvement and overall success of the team,” says Kameron. “Yulia and Katie were skilled drivers who worked together to make sure that the robot could maneuver, eject the balls, and escape the ‘flood’ at the end of each match.

“Ashlyn was an amazing tactician and spokesperson while Nadhiri brought insight when it came to repairing the robot after each competition. I was especially excited when my Spanish skills came in handy when talking to some of the teams who did not understand English.”

The process of building the robot resulted

“Many of the teams told me that the diversity of the competition allowed them to meet new people and experience new cultures,” says Kameron. “No matter which team I asked, the first thing they said was how proud and overjoyed they were to be representing their country.”

It turned out that most of the other robots were much larger than the Bermuda team’s robot and the girls had to figure out how to work around the robots while simultaneously collecting the correct balls. Unfortunately, the team was not always successful and their robot was knocked over multiple times by other teams’ robots. The team sacrificed weight and bulkiness

Despite their struggles, the team remained positive and placed well in the competition. Katoulai proudly stated, “Politics cannot stop friendship. We are all born on the same earth so there are no differences between us, other than where we live.”

Working with teams from around the world allowed the BHS girls of Team Bermuda to see the different ways that the competition could be approached, using multiple strategies. With 163 teams representing 157 countries in the competition, the team enjoyed seeing the different approaches teams took when solving problems. Team Bermuda not only represented their country well, but gained valuable skills in important areas like problem solving, communication, strategy and teamwork to add to the technical skills developed through the coding and engineering of their robot.

“Representing Bermuda was humbling and filled my whole team with pride. The knowledge that we were putting Bermuda on the map was an honour that each of us would love the opportunity to experience again,” says Kameron. “The FIRST Global 2017 Robotics competition introduced us to the diverse world of robotics. We met people from around the globe with whom we could share opinions and from whom we could learn and grow as engineers, technologists, scientists and humans. The experience was inspiring not only for us, a team of girls from BHS, but also Bermuda. It proved that robotics is a worldwide necessity without the restrictions of gender, race, ethnicity, religion or age. My hope is that this competition will spark interest in engineering and robotics for not only Bermudian students, but also students around the world.

Kameron also had the opportunity to talk to other students from other countries. Sanja Ravichandar from Team USA explained that “It was a captivating experience” and that she hoped that it would inspire more people from the community to learn robotics, especially girls.

Team Hope, a team made entirely of refugees, gave this advice: “Do not give up hope. Work with whatever resources you have until you complete your goals.”

Kameron says her favourite explanation of the competition was by Ivan Chayer, from Team Argentina who said: “The competition brings together countries and shows that there are no limits when solving problems. Cooperating together is the only way the world can move forward. Competitions like this prove that it is possible.”

*By Jennifer Burland Adams and Kameron Young*



**“The FIRST Global 2017 Robotics competition introduced us to the diverse world of robotics.”**

in the girls becoming closer, which ultimately aided them when it came to trusting and relying on each other during the heat of competition. The team also received invaluable advice and mentorship from Dave Mallon of MA Consulting, Andy Newton and Chelito Desilva from Validus, Veronica Dunkerley and Pekka Antonin from Softbank Team Japan and Dave Greenslade. Financial sponsorship was given by Trunomi and Argus, with of a practice playing field contributed by D&J Construction. BHS provided logistical support for the team.

When the team landed in Washington, it quickly settled in that they were representing Bermuda. They also realised that as an all girls’ team, the other teams and press would be keeping a close eye on their progress. Because engineering is widely thought of as a male career, each of the all-girls’ teams had to work to prove that they were just as skilled and prepared as the others.

for speed and precise movements at the cost of being easy to push over. However, this problem did not prove to be fatal as the team was assisted by the other robots in their alliance. The team quickly gained the skill of being able to nimbly grab the balls and get out of the fray before being crushed!

“While our team definitely encountered challenges, they were minor when compared to the struggle of teams such as Afghanistan, Iran, and Team Hope” continues Kameron. “When I interviewed Team Iran member Alireza Khalili Katoulai, she revealed that their government would not allow the robot kit into Iran. This meant the team had no interaction with the robot until they arrived in the US. The team had to Skype, email and send designs to a team of Iranian Americans in the US, who built the robot based on their designs. He also explained that due to the time difference, Team Iran had to wake up early in the morning because they wanted the US-based team to be comfortable while working on their robot.”

# How to choose your IT Specialisation

In order to pick an IT specialisation, you need to first understand what your options are and what skills you need for each field.

## Areas of IT

Below are some, but certainly not all, of the options available to you as you think about which ICT field you'd like to get into. Note that the list below contains some of the foundational aspects of ICT that can then lead to other, more specific, fields of expertise.

- **Computer Science** - involves designing, developing and implementing solutions to various problems. As our world becomes more technological, these solutions become more sophisticated and applicable to more industries such as health care, engineering and banking.
  - Artificial Intelligence (AI)
- **Cybersecurity** - has become a more prominent field with the increasing use of cloud services: people need to know that their data is protected. As cybersecurity is critical to both everyday users and corporations, the job opportunities are readily available.
  - Network Security/Cryptography
- **Programming** - almost every aspect of IT uses a programming language. You learn how to develop and augment various operating systems into performing the tasks you want as you want them to be performed. The more languages you master, the more desirable you become as an employee.
  - Simulations
- **Information Systems Management** - is a more analytical IT profession as you are monitoring and analyzing the various systems used within a company. This is a good basis to go into various IT fields as you can apply your knowledge and management skills to most systems.
  - Troubleshooting
- **Information Technology Management** - you can learn to create networks, websites and solutions to various problems while also gaining necessary leadership skills to help manage other professionals.
  - Artificial Intelligence (AI)
- **Software Application Development** - every computer uses applications, so this is definitely a useful degree to obtain, considering there are so many opportunities. You can develop mobile applications as well as applications used within industries.
  - Object-oriented programming

## Skills

Programming is necessary for most, if not all, IT specialisations as a foundational skill. It is an easy way for you to develop a comprehensive understanding of various systems. Below are some of the most common languages used and their respective fields:

- **SQL** [database management systems]
- **Java** [object-oriented programming]
- **Linux** [used personally/professionally]
- **Oracle** [uses SQL for Oracle databases]
- **JavaScript** [web development]
- **C++** [software application]
- **Python** [math scripts, websites]
- **Unix** [servers and mainframes]

## Certifications

The skills mentioned above can be enhanced even further, through various certifications. There are internationally, and regionally, recognized certifications that directly influence the type of job, and specific role, that you obtain. Most companies will prioritize certified applicants over others, regardless of where your degree is from.

Certifications can also help with your salary, as companies look for -and prefer- people who hold said qualifications. The more certifications that you have, the more desirable you become, and the more likely you are to be hired. These were the top 5 certifications:

1. **Certified in Risk and Information Systems Control (CRISC)**
  - a. For professionals who have to identify and manage IT risks through various Information Systems. It is the highest-paying certification of the year.
2. **Certified Information Security Manager (CISM)**
  - a. Management that focuses on security strategies and policies. This is becoming more prevalent as increasing amounts of information are being stored in public clouds.
3. **AWS Certified Solutions Architect – Associate**
  - a. Designing and deploying solutions on Amazon Web Services (AWS). Only 10,000 people have this certification, putting them in high demand, and allowing them to demand higher pay.
4. **Certified Information Systems Security Professional (CISSP)**
  - a. Demonstrating security expertise in various fields, such as: risk management, software development, assets, security engineering and operations.
5. **Project Management Professional (PMP)**
  - a. Most recognized project management certification as it includes the lifecycle skills: initiating, planning, executing, monitoring and controlling, and closing. It remains in high demand along a number of different fields.



# What skills/educational achievements are local companies looking for in cybersecurity students?

Each business in Bermuda is looking for slightly different qualities within their employees and the department they are working in. These are some of the requirements that can set you apart from others, giving you a better chance of securing the job. These are just an overview of the measures you can take to put yourself above your competition. It is also important to remember that certifications and skills can be developed over-time; they are not all required when entering into the workforce.

## Degrees and Certifications

The type of job that you want is dependent on the type of degree and qualifications that you have. For instance, if you want to be a network technician, an associate's degree (2 years) and the necessary certifications is all that's required. However, if you want to be a network analyst or engineer you may need a bachelor's degree (4 years) in addition to the necessary certifications.

A degree provides you with the fundamental skills: programming, networking, network analysis, data recovery, cryptography, and computer forensics. However, certifications are good indicators that you are able to apply your knowledge in real life.

## These are the top 5 Information Security Certifications:

1. **CompTIA Security+** [Entry Level]
2. **CEH: Certified Ethical Hacker**
3. **GSEC: SANS GIAC Security Essentials** [Entry Level]
4. **CISSP: Certified Information Systems Security Professional**
5. **CISM: Certified Information Security Manager**

## Work Experience

Cybersecurity analysts and technicians may require 3-5 years of work experience in the field while junior analysts can be hired right out of college. More senior positions, like a cybersecurity architect, may need up to ten years of work experience. This is all dependent on what qualifications you have; certifications can make up for a lack of work experience. Earning certifications after finding a job can prepare you for future job opportunities.

## Skills

Skills are what will differentiate you from your competitors. These also make you more versatile and adaptable to other areas both within IT and in other industries. You will develop some skills when you are completing your certifications and degrees and you can learn others overtime, through work experience and dedication.

## Technical

These are basic skills that may be used within your job, on a daily basis. Though this is not an exhaustive list, not all of these foundational skills are necessary within each industry.

- Operating systems, networks and software: administration, management and design.
- Programming: Java, C/C++, Python, PHP etc. (Knowledge of two or more enhances your chances).
- Understand functionality of: firewalls, routers and switches.

- Understand security of systems (databases, OS, networks, web applications).
- Understand security concepts for a variety of systems and areas (e.g. software development).
- Write code/applications that automate tasks.
- Perform assessments on systems, provide recommendations and forensically show results.

The one skill that is necessary within almost every IT profession is knowledge and understanding of a programming language. This depends on your job, but knowledge of at least two languages gives you a better chance of employment.

## Soft

These put you above your competition, and make you more adaptable to a variety of business climates. They will develop over-time, especially through university and throughout your work experience.

- Detail-oriented
- Highly adaptable
- Strong analytical and diagnostic skills
- Innovation and collaboration
- Keep up-to-date knowledge on the latest developments
- Maintaining awareness of contemporary standards, practices, procedures and methods
- Excellent communications skills

Interpersonal skills are not usually thought of when people mention IT, but because they are not prioritized, having them sets you apart from others and increases your ability to branch out into other areas within IT, enhancing your options.



# International Technology Calendar

(National Cleanup Your Computer Month)					
<b>January</b>		<b>February</b>		<b>March</b>	
15	Wikipedia Day	4	Facebook's Birthday	31	World Backup Day
16	Digital Leadership Conference	8	Clean Out Your Computer Day		
25	Macintosh Day	11	Safer Internet Day		
25-31	Winter-eeen-Mas	20	Introduce a Girl to Engineering Day		
28	Data Privacy Day	21	Engineers' Week		
		21	World Thinking Day		
<b>April</b>					
				5	Annual CSS Naked Day
				16	Foursquare Day
				23	Girls in ICT Day
				30	Birth of the World Wide Web
<b>May</b>		<b>June</b>		<b>July</b>	
1	CSS Reboot Day	30	Social Media Day	6	Take Your Webmaster to Lunch Day
				17	Happy Ripping Day
				26	Sysadmin Appreciation Day
<b>August</b>					
				12	IBM/PC Day
		(National Cybersecurity Month)			
<b>September</b>		<b>October</b>		<b>November</b>	
12	Google Commemoration Day / Video Games	11	Techie Appreciation Day	20	S.T.E.M/S.T.E.A.M Day
20	Software Freedom	16	Steve Jobs Day	25	Update Your Parents Browser Day
		26	Sysadmin Appreciation Day	30	Computer Security Day
				2	Kill a Bug Day
				11	International Shareware Day
				9-15	Hour of Code

By Andrew, IPI Intern, Summer 2017



# What Is All This Code About?

Technology and the influence it has on education have evolved and constantly changed, both on our Island and worldwide. Some of Bermuda's children are being taught computer skills and the basics of coding at school, others are attending afterschool programmes that prepare them for today's digital culture.

Parents may be skeptical or simply may not know enough when it comes to the code language that their kids are being taught. There are so many new technology topics that we never studied in school, such as coding; how do you stay in the loop, or how do you support your child in a new learning process that is also new to you?

To give you some relief, there are resources that are available to parents in Bermuda and that are the same tools your child uses to learn the basics of coding.

Paper booklets or flash cards and heavy back-packs stuffed with books have now given way to accessing information within seconds via computer, tablet or cellphone. They don't have physical study groups or call their friend to discuss their homework assignment. Instead, they use messaging apps such as WhatsApp, Snap Chat, Facebook and OoVoo, just to name a few. Most notably, YouTube has instructional videos on any subject you can think of.

As with many activities, we coach, support, and help our children adapt to learning as they develop. Coding shouldn't be any different. Technology and its many languages can be overwhelming, but with support and resources readily available at your fingertips, coding can be a language both you and your child enjoy and understand.

## All this talk about coding... but what is it?

Coding is a language that is logic-based and involves computational thinking. The structured, logical thought process behind coding is referred to as computational thinking; in layman terms - you are learning to think like a computer. Coding is writing a language that tells the computer what to do through written instructions that are precise and logical -because computers take information literally. People who create the code are called coders, programmers, or developers. As technology continues to evolve, people in all industries, not just our children, can benefit from learning the basics of coding.

Why should our children learn to code? Computer code is an integral part of today's modern world and learning to understand it will give them many advantages as they evolve in the digital age, such as helping with problem-solving and critical thinking. It is the underlying function for so many things that are software and hardware related. Not to mention that it is also an ever-growing industry which will create an influx of jobs over the next 5-10 years world-wide.

Skills in coding are increasingly valuable as advances in technology continue. If your child finds coding exciting and challenging, it might be worth encouraging them to think about a career that involves coding tasks – there are plenty of them:

- ✓ Web Development – a creative career related to building and maintaining websites and applications.
- ✓ Gaming – writing, building and testing new games which include detailed graphical images.
- ✓ Software – browsers (e.g. Google Chrome and Internet Explorer) are used to run our code, but the browsers themselves are built with code!
- ✓ AI – Artificial Intelligence is the programming of machines to absorb, process and make decisions based on input.
- ✓ Data Science – using large amounts of input data, statistical analysis can provide insight into trends and behaviors.

Whilst there are many opportunities in coding there are also some misconceptions about coding which might deter you from encouraging your child to learn to code, such as:

- ✓ “You need to be really good at math” – a page of complicated code might look similar to a page of equations and coding will require you to think in a logical, structured way and can include numbers. However, you do not necessarily need to be good at math to learn to code. Don't get me wrong - there are overlaps but one does not have to be a math wizard.
- ✓ “Coding is boring and not creative” - an initial look at a page of code will not look exciting but coding can be used to create fun games with graphical backgrounds and applications. It can actually be additively entertaining while solving problems with a creative flair.
- ✓ “It's complicated” – Like most subjects, coding does become more difficult as you progress, but this shouldn't deter you from getting started.

There are many ways that one can learn to code and many professionals are self-taught. Learning through necessity is effective, but it can give you specific skills while leaving gaps in your understanding. As with any new skill, it's important to start at the beginning and learn the fundamentals.

By Coral Wells, [www.connecttech.bm](http://www.connecttech.bm)

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## A day at Startup Weekend

I had an awesome time at Startup Weekend. I went in with no expectations of what it was or what it was going to be like. But I do want to say that it definitely exceeded them. I didn't have any entrepreneurial ideas when I signed up, but I still wanted to see what the event was about and what it had to offer. The great thing about Startup Weekend, is that even if you don't come with ideas, once you start to hear others pitch you still have a chance to pitch an idea if you have one.

Even though I didn't pitch an idea, I did get a chance to join a leader of one of the ideas that were pitched to assist the team in formulating that idea. The group participation was very empowering because not only do you get to meet new people and network but you also learn how to take an idea from just being an idea to actually creating a viable product. And the coaching sessions were very insightful because you can use their advice not only at this event but also in the future if you decide to develop an idea.

Overall Startup Weekend is a great experience to get involved in, and it has a lot to offer entrepreneurs or those that don't realize yet that they are an entrepreneur. It is definitely rewarding considering the knowledge that you obtain over such a short period of time and I would tell anybody to definitely try it.

“My Kind of Bermuda”



“Success occurs when your dreams get bigger than your excuses”

I have always set goals for myself and worked hard at achieving them without quitting and by being persistent.

I have spent the last 6 months completing entrepreneurial courses and attending Inspire eBusiness seminars.

After participating in my first Startup Weekend my mind was opened to the opportunities that are out there.

Entrepreneurship is a continuing goal of mine. One I will be bringing to fruition very soon.

**COLINA  
OUTERBRIDGE**  
Coach

# What does Data Quality have to do with Cybercrime?



Much of what is said about cyber risk in the press these days is about Hackers stealing personal data held by large multi-national companies, but is this the size of cybercrime?

What do they do with that information once they have it? How do they benefit from such activity? They must either use that information to clone the people whose data they stole or sell it to other people. So how can we defend against their profiting from such activities?

Well for one, we can strengthen our cyber defenses so that they are unable to steal that data in the first place, but other articles in this publication will speak more on that.

A couple of other things we can do is stop them from profiting from the cloning of that data directly or from selling it to others. In either case we are now entering the world of financial crime prevention.

## So, how do we do that?

Many governments around the world are developing laws with a much stricter approach to address financial crime. From improved data quality and knowledge of who our customers are to details of the transactions they are conducting, and also economic sanctions to prevent them from holding accounts and conducting transactions in the regulated financial sectors those laws address.

The advances in technology over the past decade have been fast developing in response to those laws. This is so they have teeth in real time, and so we can better protect the people whose data may have been stolen.

We are now seeing much more sophisticated applications that can ease the processes of collecting the data that we need in order to stop the criminals from profiting. We are also seeing huge strides in the big data solutions that can help us sift through the data to help us catch and stop those criminals.

## But what if that data is wrong?

And there it is... our data must be right in order for us to stop those criminals. We need people who can help us define how data is collected and stored, test it to see if it is wrong, figure out how we can fix it and do so, and put controls in place to make sure it is right going forward. This field is called Data Management.

While the name "Data Management" doesn't seem that exciting, it makes a huge difference to the safety of our data, which is the lifeblood of our finances and our online social presence. Data Management is key to our overall safety.

So as you are considering your future and a career in IT, perhaps you might want to consider the fastest growing area in IT that is spawning buzzwords such as "Cyber", "FinTech", "RegTech" and "Big Data" and whether Data Management is the way that you want to make a difference in stopping the criminals.

By David Petty

# Technology = Fun!



BERMUDA ISLAND GAMES



**Information Technology is not always about scanning documents, and calculating on spreadsheets - sometimes it is about fighting pirates and finding hidden treasure!**

I've had the opportunity to work in various areas of Information Technology – including helpdesk, network support, application development, website development and mobile app development – but the most recent area I have under my belt is game development.

Specifically, I am the producer of an Indie (independent) mobile game company, Bermuda Island Games ([www.bermudaislandgames.com](http://www.bermudaislandgames.com)),

whose mission is to promote Bermuda through gaming.

Having the freedom to create anything you want is enjoyable! It also makes it easy to waste time and may take away from your regular paying job if you're not careful.

Therefore it requires good time-management skills, and that you set realistic goals for what you can accomplish. In addition, in my situation, having a small team means that I also need to cover all of the administrative work, such as marketing, public relations, accounting, managing deadlines and anything else that comes my way.

In the game industry there are several different areas of expertise:

- graphics design (sprite animation and background images/movies),
- audio engineering (background music and sound effects),
- game development (UI and programming),
- game testing (hit "jump" 50 times and see what happens),
- publishing (making sure the game is sold), or
- producing (defining the concept of the game and putting it all together).

With many online training videos and demos to teach you about game development, the real challenge is making sure that what you set your mind to will pay off in the end – both financially and in gratification. If you are one of the many that love to play games and have always wondered how some of your favorite games actually work, then I encourage you to try it out and see if it is something that you can make a career in.

By Adrian Lodge, Founder of Bermuda Island Games

# Small Business and Cybersecurity

## What does it all mean?

### **Acting Micro, Small & Medium Enterprise Director, BEDC, Jamillah Lodge**

As a small business owner, there are many things that you must worry about, like your business model, profit margin, customer acquisition, business growth. These are just some of the traditional key operational issues that need to be managed throughout the



lifecycle of your business. In the 21st century these are no longer all the things that should be considered – what about cybersecurity? What is Cybersecurity? According to [www.ITGovernance.co.uk](http://www.ITGovernance.co.uk), “Cybersecurity comprises technologies, processes and controls that are designed to protect systems, networks, and data from cyber attacks. Effective cybersecurity reduces the risk of cyber attacks, and protects organisations and individuals from the unauthorised exploitation of systems, networks and technologies.”

In Bermuda, you may be thinking that cyber attacks are few and far between and have no relevance on your day-to-day retail or service based business. But ask yourself, what is the thing that we all use and could not conduct business without? I'll answer it for you, it's a computer. And more specifically, it's the Internet. On an Island that is 21 square miles, the world can be just a few clicks away and so could a cyber attack. How then do you prepare your business, or organisation to mitigate any impending attacks? In this article we will look at five basic steps that you can take to begin the preparation process.

In an interview with a business continuity specialist, Caroline Rance of Rance Consulting states, “the biggest threat to your organization's cybersecurity is the human element.” Although computers are the medium by which most cyber attacks occur, it is the user -the human- that initiates the attack and enables it. Caroline provided some simple tips that all humans can implement to ensure business continuity.

#### **Keep it Clean**

Start with good computer hygiene. Update your software on a regular basis. Update patches when you receive them from software providers. Create long and strong passwords that contain little-known information about you, never share them with anyone, and change them frequently.

#### **Separate but Equal**

Do not use your work or company computer or mobile device for personal use. Cybersecurity breaches can come when you are surfing your favorite guilty pleasure, that is a seemingly harmless, website.

#### **Track it to Back it... Up**

Ensure that you have tracked all of your assets, computers, hard drives, scanners printers etc. Write down serial numbers, dates of purchase, where the software was purchased and monitor the life span of the hardware and software. Caroline states that when some hardware and software are at the end of life it can create issues and make it more difficult to keep cyber secure.

#### **It's Getting Hot in Here**

That's right. Protect your data by implementing a firewall. Cisco defines “a firewall as a network security device that monitors traffic to or from your network. It allows or blocks traffic based on a defined set of security rules.” This becomes important when you are collecting and managing your customer's personal information. A new piece of Bermuda legislation, the Personal Information Protection Act, now mandates that you pro-actively protect your client's personal information.

#### **Document your Process**

Identify how your network is setup and create a document that lays out this information. Determine what information is being stored where. Identify whether it is being stored physically in a safe, in a cloud, or on a server and note where that server is located. State what the back-up procedure is and what the process is for accessing the back-up, and how to restore the information in the event of a failure or a breach. Store administrative passwords in a secure location and only provide limited access to it.

*These steps are very basic in the grand scheme of things and can be achieved by most small business owners.*

*Creating a cyber secure framework entails a lot more and I would encourage you to work with experts to begin the full process.*

*In most cases, this would include a cybersecurity audit to access where the gaps are in your system and from there, to plan how to fill those gaps.*

**For more information on cybersecurity and business continuity you can contact Caroline Rance at [crance@crc-bda.com](mailto:crance@crc-bda.com) or the Department of ICT Policy & Innovation at [mbiadillah@gov.bm](mailto:mbiadillah@gov.bm).**

*By Jamillah Lodge*

# Digital Leadership Conference



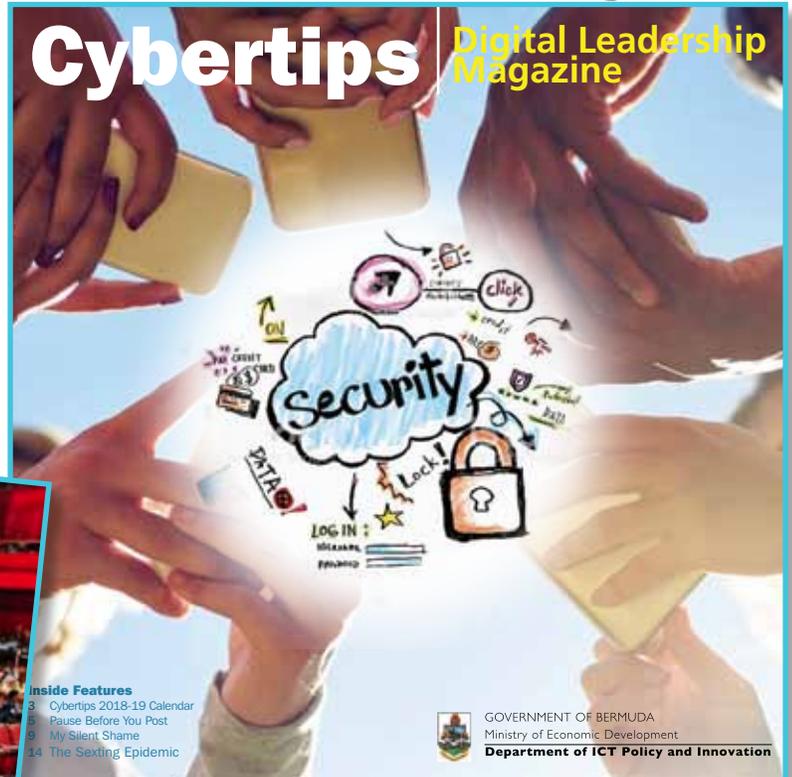
'Cybertips' is an initiative run by the Department of ICT Policy and Innovation (IPI), within the Government of Bermuda, which visits schools, youth organizations and community events to help provide Bermudian students and young people with the necessary knowledge and skills to use the Internet safely. There is a need for an island-wide campaign to inform but also train students on how to actively face issues relating to cyberbullying and be 'up-standers'. This led to the development and conception of the Digital Leadership Conference, the inaugural conference took place on May 7th, 2018 with over 600 Bermudian students in attendance, from both public and private schools. The second conference took place March 27th, 2019.



Students participated in panels and workshops that were developed by the Student Steering Committee, in collaboration with IPI. This committee comprised of student representatives from multiple local schools. The committee identified key areas effecting Bermuda's young people and designed panels and workshops that were best suited to tackle these ongoing issues. Each panel was equipped with various subject matter experts from across the island, who volunteered to help educate the students about the legal, emotional and physical implications that these digital issues, like cyberbullying, cause. There were experts from various sectors, including: law enforcement, education, social services and child protective services.

A Digital Leadership magazine was developed for the conference, where members of the Student Steering Committee and some panellists wrote about the various effects of social media, cyberbullying, video games and some of the benefits of technology. This served as a resource of more in-depth information on specific experiences and issues that may not have been breached during the conference itself.

In 2018, Deana Puccio, of the RAP Project, was one of the contributors for the magazine, as well as keynote speaker for the conference, providing valuable insight into the global impact that



social media misuse and digital issues have on society. The Hon. Wayne Caines, JP, MP, the Minister of National Security, also gave a gripping presentation about not just the negative effects of social media, but also provided insight into how students can leverage their knowledge to enhance their experience. A positive perspective about social media let the students see that, if they follow the guidance of the panellists, they could expand their opportunities for scholarships, schools, and careers.

In 2019, award-winning youth speaker and author A'ric Jackson discussed 'Keeping it Real' and 'The Ripple Effect'. The 2019 conference geared towards understanding how your online actions adversely affect others and how we change our negative thought processes into that of leadership.

2018 included an event for educators and mentors allowing them the opportunity to ask the panellists questions about what warning signs to look out for, how they could help someone being bullied and the protocol they should follow. Afterwards, a parent and community panel was also held where attendees could learn how to protect their children, what parental controls they can implement, etc. Using the student feedback, allowed the moderators to guide the discussion where parents were aware of why their children might not feel comfortable talking to them. In 2019 the parent and educator panel discussions were combined.

While cyberbullying and other digital issues that affect young people have yet to be solved, the Digital Leadership Conference helped to inform residents in Bermuda about the dangers that are out there and the ways they can help ensure young people stay safe online.

# Bermuda's 2018-2022 Cybersecurity Strategy

As Bermuda embarks on the process of strengthening its cybersecurity posture, the Bermuda Cybersecurity Strategy 2018-2022 sets out the following core elements:

- The current status of cybersecurity in Bermuda, including both existing and emerging cyber-threats facing Bermuda;
- The Cybersecurity Vision and Strategic Goals;
- Principles that guide the implementation of this Strategy;
- Roles and responsibilities of relevant stakeholders; and
- The methodology for implementing the Strategy and monitoring its progress.

Key findings of the current state assessment included:

- Bermuda organisations recognise that cybersecurity is a key issue in its drive to embrace future technologies for economic diversification; however, there was no overarching national cybersecurity programme for the country.
- Bermuda does not have a formal framework for monitoring cyber-threats and for preventing, detecting, and mitigating against cyber-attacks.
- Bermuda has identified Critical National Infrastructure entities (CNIs) but has not categorised their respective Critical Information Infrastructures (CII). In addition, there is no national risk management framework and contingency plans against cyber-attacks to ensure the resiliency of CII.
- Bermuda does not have sufficiently adequate and effective legislation, policies and regulations on cybersecurity to address both current and future cybersecurity threats.
- While the Personal Information Protection Act 2016 is in place, it has not been fully implemented yet.

Although Bermuda is a small island-nation, it is imperative that there be a collective understanding and recognition of the shared responsibility of all stakeholders in protecting the CII and ICT services in Bermuda. This understanding is essential to the management and implementation of this Strategy, hence the delineation of roles and responsibilities of key stakeholder groups in Bermuda is described as follows:

- The Government of Bermuda: Cybersecurity requires a whole-of-government approach.
- Cybersecurity Governance Board: The Strategy emphasises that Bermuda will establish a cybersecurity governance body under cybersecurity legislation to lead the implementation of the Strategy.
- Bermuda CSIRT: The Strategy calls for the establishment of a national CSIRT for Bermuda.
- Private Organisations: private sector companies such as financial organisations, based in Bermuda own and manage systems, networks and information in their day-to-day operations and provision of services and must protect them.
- Owners and operators of Critical Information Infrastructure and Information Systems: These entities in Bermuda, whether publicly- or privately-owned, are responsible for ensuring the protection and resilience of their systems, networks and data, and will be required to execute all appropriate measures to ensure this protection and resilience.

## Bermuda's Vision for Cybersecurity is:

**A secure, resilient and trustworthy cyberspace that drives socio-economic development which fosters an informed and inclusive society in Bermuda**

The Vision for Cybersecurity is attained through the following four (4) Strategic Goals:

### ▶ Strategic Goal 1

Protect Bermuda's cyberspace

### ▶ Strategic Goal 2

Develop, enact and maintain appropriate legislation, regulation, policies and procedures to enhance cybersecurity and reduce cybercrime

### ▶ Strategic Goal 3

Promote cybersecurity awareness and capacity building

### ▶ Strategic Goal 4

Enhance local and international cybersecurity collaboration and co-operation





# 2020 Digital Leadership Conference

January 16 & 17, 2020

SAVE THE DATE



GOVERNMENT OF BERMUDA  
Department of ICT Policy and Innovation

## Cybertips Event Calendar

For more information on the Cybertips Programme visit:

[www.cybertips.bm](http://www.cybertips.bm)

### December 2019

9-15 International Hour of Code

### January 2020

16-17 Digital Leadership Conference  
16-17 Digital Art Competition

### February 2020

11 Safer Internet Day for Seniors  
17 Twizy Design Competition

### April 2020

23 Girls in ICT Day Celebration



# have you had the talk?



As soon as your kids begin to go online, it's important to outline your expectations of their behavior. By acting responsibly and respectfully, they will enjoy their time online and get the best of the Internet while mostly avoiding things such as cyberbullying and inappropriate content.

For more information and guidance on having "The Talk" with your child visit [www.cybertips.bm](http://www.cybertips.bm) or contact Cybertips at 294-2774.



## Girls in ICT Day

Expand horizons,  
change attitudes

an ITU initiative



# 23 FEBRUARY 2020

BEING A WOMAN IN A FIELD DOMINATED BY MEN MEANS THAT YOU ARE GOING TO HAVE A **UNIQUE VOICE**

IT'S IMPORTANT TO EMRACE THAT

- Erin Teague

