

# Ontario Labour Market Report

CIP Program 11.07: Computer Science

Most Relevant Academic Program(s) at Brock: Computer Science

EMSI Q3 2016 Data Set

February 2017



Institutional Analysis and Planning

Brock University

1812 Sir Isaac Brock Way

905-688-5550



## Table of Contents

### Section 1: Program Overview

- a) How many degrees are completed in Ontario (Labour Supply)?.....3
- b) What types of degrees are completed in Ontario?.....3
- c) What other similar programs are offered in Ontario? .....4
- d) What other similar programs are offered at Brock University?.....4

### Section 2: Target Occupations

- a) What top growing target occupations are obtained by Alumni?.....5
- b) What are the growth prospects for these occupations (Demand)?.....6
- c) How much are these target occupations earning?.....7
- d) Where are the hottest places in Ontario in terms of job growth?.....8

### Section 3: Top Three Target Occupation Summaries

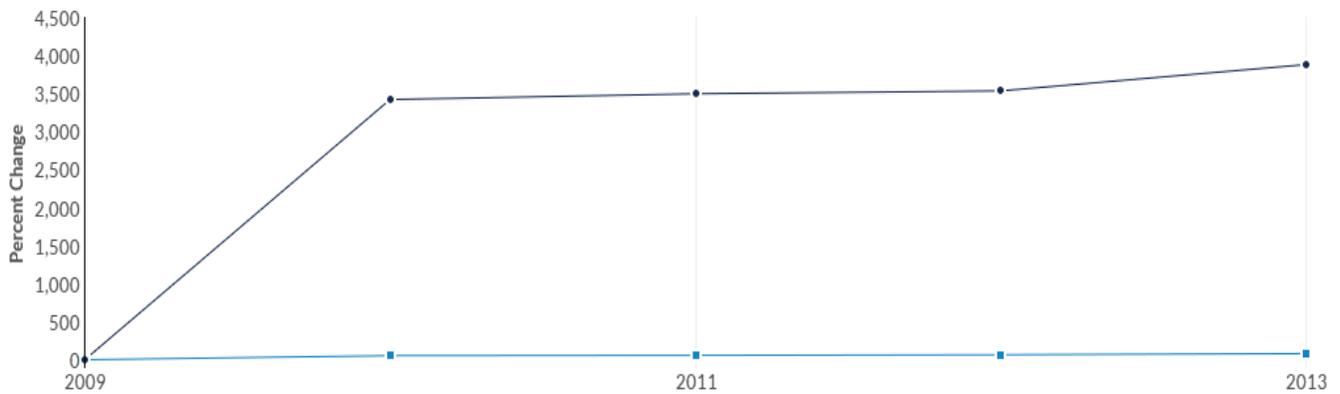
*\*\*Includes Description, Skills & Competencies, Ontario Trends in Field, Location of Job, Industries*

- a) Information Systems Analyst and Consultant.....10
  - b) Computer Programmer and Interactive Media Developer.....12
  - c) Software Engineer and Designer.....14
- References and Notes.....16

# Section 1: Program Overview for Computer Science (11.07)

<b>25</b> <b>Ontario Institutions</b> had Completions in the last 5 years	<b>1,289</b> <b>Ontario Program Completions (2013)</b>
---	---

a) How many completions have there been in Ontario compared to Canada? (11.07)



Region	2009 Completions	2013 Completions	% Change
• Ontario	32	1,289	3,882.8%
• Canada	1,809	3,271	80.8%

b) What types of degrees are coming from Ontario? (11.07)



Award Level	Completions (2013)	Percent
• Bachelors degree	928	72.0%
• Masters Degree	266	20.6%
• Doctors Degree	95	7.4%

### c) What other similar programs are offered in Ontario?

24 Programs (2013)		10,599 Completions (2013)
CIP Code	Program	Completions (2013)
50.04	Design and applied arts	2,323
14.10	Electrical, electronics and communications engineering	1,443
15.12	Computer engineering technologies/technicians	1,082
09.07	Radio, television and digital communication	809
14.09	Computer engineering	753

### d) What other similar programs are offered at Brock University?

**Computing and Business<sup>1</sup>** - Computing and Business is a four-year Honours program leading to a Bachelor of Computing and Business degree, designed for students with an interest in computer science and its application in business. With the current trends to outsourcing and contracting for the provision of computing resources in business, it is imperative that computing practitioners have a strong grounding in business and business practices. These practitioners need entrepreneurial skills as they will often have to establish themselves as independent consultants and compete for contracts. This degree is intended to prepare students to compete in this market.

**Computer and Network Communication<sup>2</sup>** - This program caters to the increasing demand in the Information Technology industry for professionals who have a solid foundation in software development as well as practical technical skills in system security, telecommunications, network analysis and administration. Normally, this involves attending college after gaining a university degree, but the Brock and Sheridan program combines the two in a single integrated package.

**Game Design<sup>3</sup>** - The GAME program combines study at Brock University and Niagara College, focusing on the concepts, contexts and mechanics of computer games. Students may choose one of two study options: Bachelor of Arts (Honours) Game Design and an Advanced Diploma in Game Development or a Bachelor of Science (Honours) Game Programming and an Advanced Diploma in Game Development. Students examine the history, discourses and production of games and participate in three major collaborative projects that result in the creation and production of fully realized computer games in the second, third and fourth years of the program.

## Section 2: Target Occupations

### a) Which top growing jobs are obtained by Alumni?

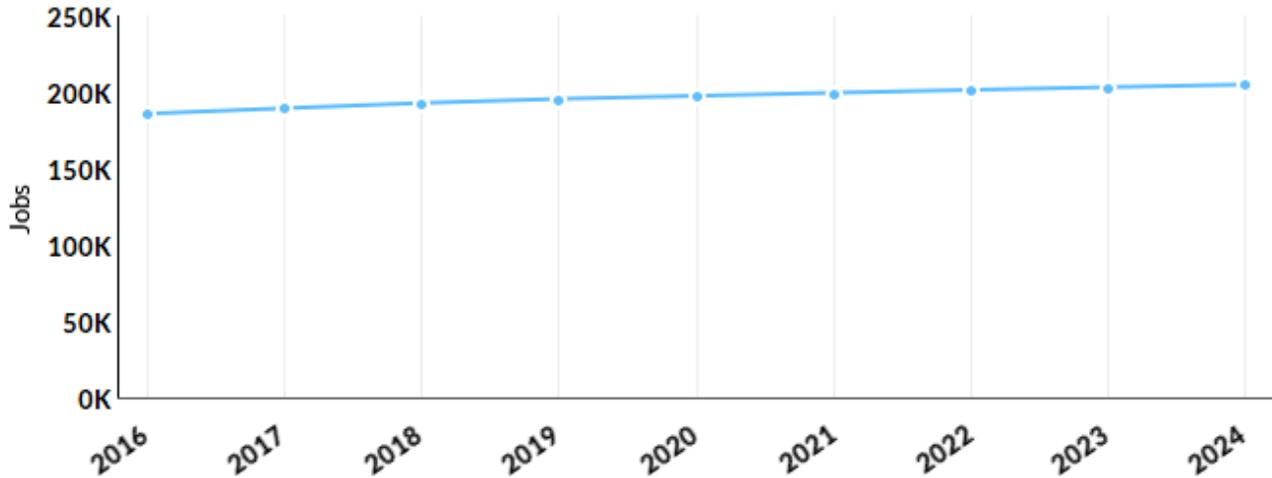
<b>181,824</b> Jobs <sup>7</sup> (2015) 24% above Canada's average	<b>10.2%</b> % Change (2016-2024) Canada: 10.0%	<b>\$37.51/hr</b> Median Hourly Wages <sup>8</sup> Canada: \$36.62/hr
--	---	---

Occupation	2016 Jobs <sup>7</sup>	Median Hourly Wages <sup>8</sup>	Growth (2016 - 2024)	Location Quotient <sup>4</sup> (2016)
Information systems analysts and consultants	73,937	\$38.46/hr	11.57%	1.25
Computer programmers and interactive media developers	62,673	\$35.02/hr	8.59%	1.17
Software engineers and designers	24,994	\$45.55/hr	10.84%	1.40
Database analysts and data administrators	12,944	\$27.97/hr	8.02%	1.16
Computer engineers (except software engineers and designers)	11,150	\$38.46/hr	11.90%	1.27



## b) What are the growth prospects for these target occupations?

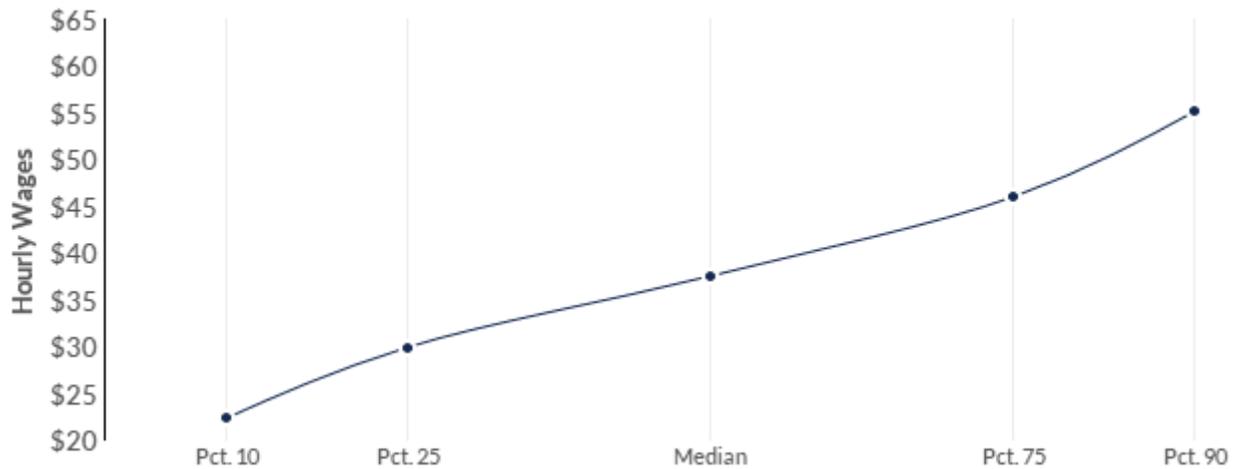
<b>185,698</b> 2016 Jobs <sup>7</sup>	<b>204,710</b> 2024 Jobs <sup>7</sup>	<b>19,012</b> Change (2016-2024)	<b>10.2%</b> % Change (2016-2024)
--	--	-------------------------------------	--------------------------------------



Occupation	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	Change	% Change
Computer engineers (except software engineers and designers) (2147)	11,150	12,477	1,327	12%
Information systems analysts and consultants (2171)	73,937	82,491	8,554	12%
Database analysts and data administrators (2172)	12,944	13,982	1,038	8%
Software engineers and designers (2173)	24,994	27,704	2,710	11%
Computer programmers and interactive media developers (2174)	62,673	68,056	5,383	9%

### c) How much are these target occupations earning?

<b>\$29.88/hr</b> 25th Percentile Wages <sup>8</sup>	<b>\$37.51/hr</b> Median Wages <sup>8</sup>	<b>\$45.99/hr</b> 75th Percentile Wages <sup>8</sup>
---	--	---



Occupation	25th Percentile Wages <sup>8</sup>	Median Wages <sup>8</sup>	75th Percentile Wages <sup>8</sup>
Computer engineers (except software engineers and designers) (2147)	\$33.65	\$38.46	\$48.72
Information systems analysts and consultants (2171)	\$30.77	\$38.46	\$46.15
Database analysts and data administrators (2172)	\$23.60	\$27.97	\$40.00
Software engineers and designers (2173)	\$37.50	\$45.55	\$53.42
Computer programmers and interactive media developers (2174)	\$26.46	\$35.02	\$43.62

### d) Where are the hottest places in Ontario in terms of job growth?



Census Division	Census Division Name	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	2016 - 2024 Change	2016 - 2024 % Change	Expected Change	2016 Location Quotient <sup>4</sup>	2024 Location Quotient <sup>4</sup>	2015 Avg. Hourly Wages <sup>8</sup>
3546	Haliburton	48	61	13	27%	5	0.35	0.39	\$37.89
3544	Muskoka	162	193	31	19%	17	0.28	0.31	\$37.87
3516	Kawartha Lakes	180	213	33	18%	18	0.35	0.38	\$37.96
3514	Northumberland and	219	255	36	16%	22	0.33	0.35	\$38.08
3551	Manitoulin	38	44	6	16%	4	0.29	0.30	\$33.54
3549	Parry Sound	84	97	13	15%	8	0.28	0.30	\$33.45
3540	Huron	94	108	14	15%	10	0.17	0.18	\$34.90
3522	Dufferin	277	317	40	14%	27	0.59	0.61	\$36.25
3523	Wellington	1,804	2,063	259	14%	181	0.67	0.69	\$36.53
3531	Perth	218	249	31	14%	22	0.22	0.22	\$34.97
3515	Peterborough	515	588	73	14%	52	0.36	0.37	\$38.06
3502	Prescott and Russell	509	581	72	14%	51	0.82	0.84	\$39.97
3548	Nipissing	413	471	58	14%	41	0.41	0.42	\$33.62

Census Division	Census Division Name	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	2016 - 2024 Change	2016 - 2024 % Change	Expected Change	2016 Location Quotient <sup>4</sup>	2024 Location Quotient <sup>4</sup>	2015 Avg. Hourly Wages <sup>8</sup>
3541	Bruce	162	184	22	14%	17	0.22	0.22	\$34.93
3543	Simcoe	2,308	2,620	312	14%	231	0.56	0.57	\$36.25
3507	Leeds and Grenville	1,047	1,188	141	13%	105	1.15	1.19	\$40.05
3519	York	20,573	23,322	2,749	13%	2,060	1.72	1.75	\$38.80
3553	Greater Sudbury / Grand Sudbury	768	870	102	13%	76	0.39	0.40	\$33.63
3509	Lanark	618	700	82	13%	62	1.19	1.23	\$40.47
3501	Stormont, Dundas and Glengarry	1,172	1,325	153	13%	117	1.14	1.17	\$40.15
3556	Cochrane	242	273	31	13%	24	0.26	0.26	\$33.67
3542	Grey	168	189	21	13%	17	0.20	0.20	\$34.83
3521	Peel	24,099	27,083	2,984	12%	2,413	1.49	1.51	\$38.69
3559	Rainy River	49	55	6	12%	5	0.24	0.24	\$34.79
3552	Sudbury	41	46	5	12%	4	0.23	0.23	\$33.46
3557	Algoma	394	442	48	12%	39	0.33	0.34	\$33.51
3554	Timiskaming	87	97	10	11%	9	0.26	0.26	\$33.69
3524	Halton	5,678	6,325	647	11%	568	1.00	1.00	\$38.29
3520	Toronto	60,864	66,980	6,116	10%	6,093	1.66	1.66	\$38.33
3558	Thunder Bay	555	609	54	10%	56	0.33	0.33	\$35.03
3560	Kenora	148	162	14	9%	15	0.24	0.25	\$34.86
3518	Durham	4,363	4,763	400	9%	436	0.90	0.89	\$38.45
3506	Ottawa	37,885	41,259	3,374	9%	3,792	2.96	2.94	\$40.17
3530	Waterloo	7,379	7,982	603	8%	739	1.16	1.14	\$37.01
3547	Renfrew	552	594	42	8%	56	0.52	0.50	\$35.51
3513	Prince Edward	28	30	2	7%	3	0.19	0.19	\$34.71
3511	Lennox and Addington	73	78	5	7%	7	0.26	0.25	\$34.81

# Section 3: Top Three Job Occupation Summaries

## a) Information Systems Analyst and Consultant

Information systems analysts and consultants analyze systems requirements, develop and implement information systems development plans, policies and procedures, and provide advice on a wide range of information systems issues. They are employed in information technology consulting firms and in information technology units throughout the private and public sectors, or they may be self-employ<sup>5</sup>.

### Technology Skills Required<sup>6</sup>:

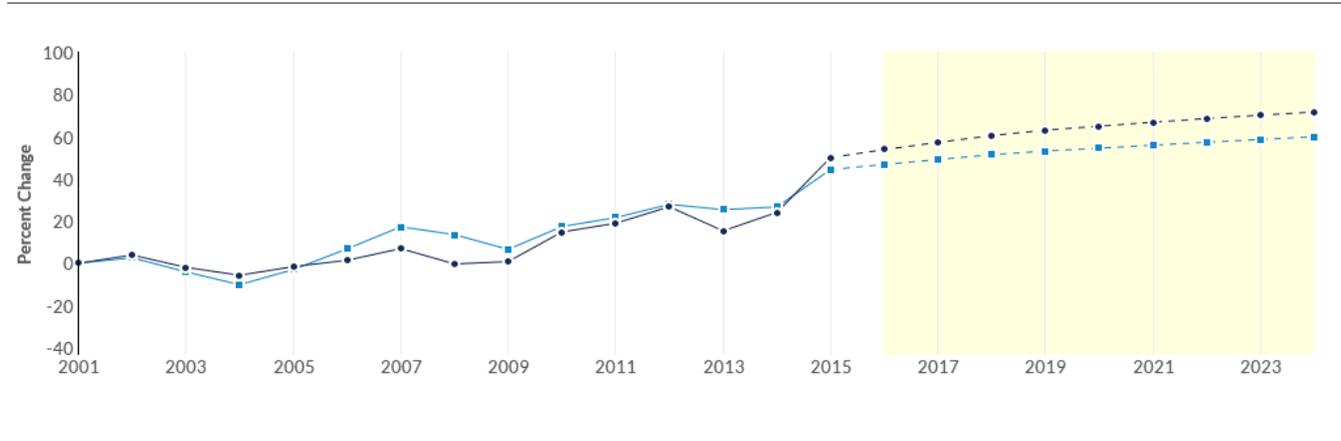
- Data Base Management System Software: Apache Hadoop, Apache Pig, NoSQL, Oracle PL/SQL
- Object or Component Oriented Development Software: C++, Objective C, Python, R

### Skills & Abilities Required <sup>6</sup>:

- Active Listening: listening intently, understanding key points, and asking questions while appropriate
- Critical Thinking: using logic and reasoning to evaluate solutions
- Oral Expression: communicating information and ideas clearly

<b>72,126</b> Jobs <sup>7</sup> (2015) <small>25% above Canada's average</small>	<b>11.6%</b> % Change (2016-2024) <small>Canada: 8.9%</small>	<b>\$38.46/hr</b> Median Hourly Wages <sup>8</sup> <small>Canada: \$37.92/hr</small>
--	---	--

## Ontario Trends



Region	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	Change	% Change
• Ontario	73,937	82,491	8,554	11.6%
• Canada	153,772	167,493	13,721	8.9%

## Where are the most jobs in Ontario for Information Systems Analysts and Consultants?



Census Metropolitan Aggregate	2024 Jobs <sup>7</sup>
Toronto	50,203
Ottawa - Gatineau	18,589
Kitchener - Cambridge - Waterloo	2,631
London	1,900
Hamilton	1,270

## Who are employing Information Systems Analysts and Consultants?

Industry	Occupation Jobs <sup>7</sup> in Industry (2015)	% of Occupation in Industry (2015)	% of Total Jobs <sup>7</sup> in Industry (2015)
Computer systems design and related services	16,186	22.4%	18.3%
Depository credit intermediation	7,003	9.7%	5.2%
Other federal services	5,980	8.3%	4.8%
Computer and communications equipment and supplies merchant wholesalers	3,482	4.8%	11.0%
Insurance carriers	2,005	2.8%	3.9%



## b) Computer Programmer and Interactive Media Developer

Computer programmers write, modify, integrate and test computer code for microcomputer and mainframe software applications, data processing applications, operating systems-level software and communications software. Interactive media developers write, modify, integrate and test computer code for Internet applications, computer-based training software, computer games, film, video and other interactive media. They are employed in computer software development firms, information technology consulting firms, and in information technology units throughout the private and public sectors<sup>5</sup>.

### Technology Skills Required<sup>6</sup>:

- Compiler and Decompiler Software: command interpreters, Just-in-time compiler, Stage compiler, Threaded code compiler
- Data Base Management System Software: Apache Hadoop, Apache Pig, NoSQL, Oracle PL/SQL
- Object or Component Oriented Development Software: C++, Python, R, Spark

### Skills & Abilities Required<sup>6</sup>:

- Programming: writing computer programs for various purpose
- Information Ordering: re-organizing dataset according to specific rules
- Complex Problem Solving: identifying complex problems and reviewing related information to develop and evaluate options and implement solution
- Near Vision: The ability to see details at close range

**61,694**

Jobs<sup>7</sup> (2015)

18% above Canada's average

**8.6%**

% Change (2016-2024)

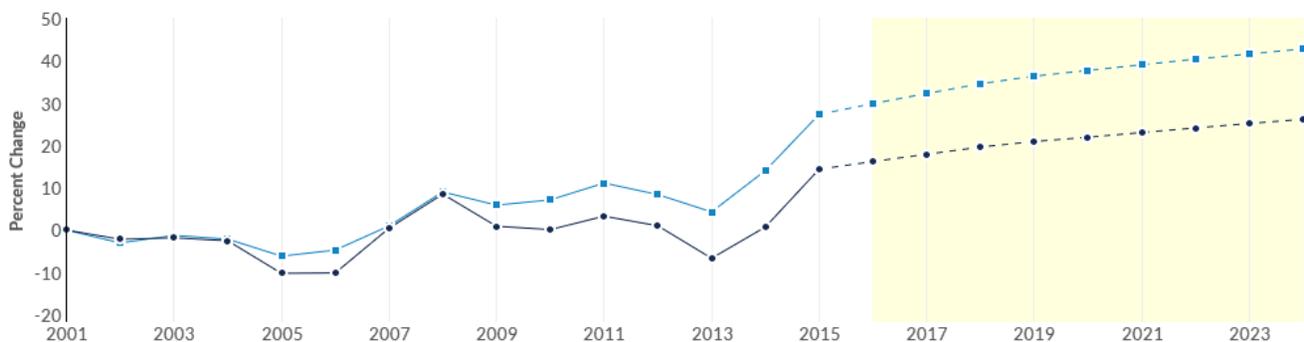
Canada: 9.9%

**\$35.02/hr**

Median Hourly Wages<sup>8</sup>

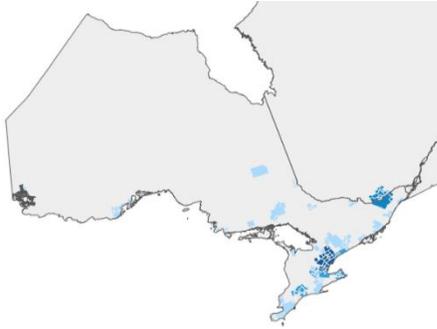
Canada: \$34.10/hr

## Ontario Trends



Region	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	Change	% Change
• Ontario	62,673	68,056	5,383	8.6%
• Canada	139,596	153,472	13,876	9.9%

## Where are the most jobs in Ontario for Computer Programmers and Interactive Media Developers?



Census Metropolitan Aggregate	2024 Jobs <sup>7</sup>
Toronto	43,072
Ottawa - Gatineau	13,108
Kitchener - Cambridge - Waterloo	2,653
Hamilton	1,620
London	1,599

## Who are employing Computer Programmers and Interactive Media Developers?

Industry	Occupation Jobs <sup>7</sup> in Industry (2015)	% of Occupation in Industry (2015)	% of Total Jobs <sup>7</sup> in Industry (2015)
Computer systems design and related services	17,901	29.0%	20.2%
Other federal services	4,334	7.0%	3.5%
Software publishers	4,147	6.7%	26.5%
Depository credit intermediation	3,359	5.4%	2.5%
Computer and communications equipment and supplies merchant wholesalers	1,951	3.2%	6.2%

### c) Software Engineer and Designer

Software engineers and designers research, design, evaluate, integrate and maintain software applications, technical environments, operating systems, embedded software, information warehouses and telecommunications software. They are employed in information technology consulting firms, information technology research and development firms, and information technology units throughout the private and public sectors, or they may be self-employed<sup>5</sup>

#### Technology Skills Required<sup>6</sup>:

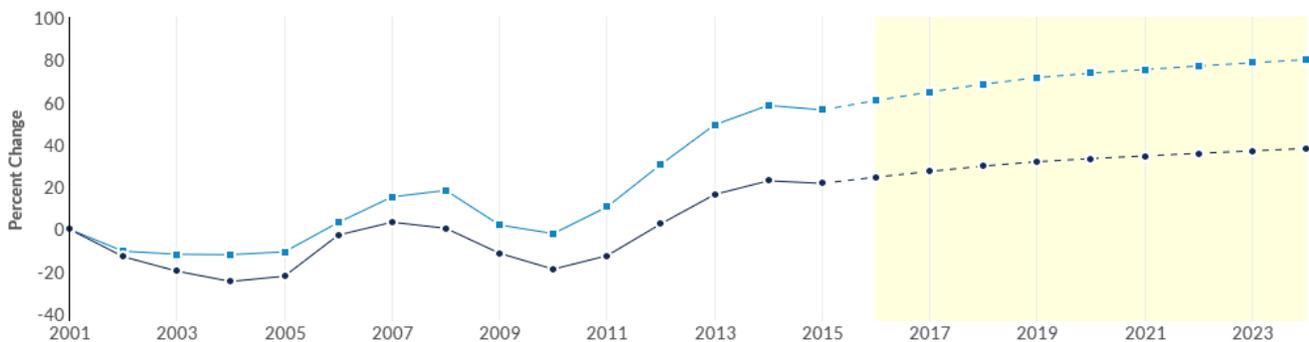
- Program Testing Software: Defect tracking software, Hewlett Packard LoadRunner, Source code editor software, Usability testing software
- Objective or Component Oriented Development Software: C++, Python, R, Spark
- Database Management System Software: Apache Hadoop, Apache Pig, Mongo DB, Talented Big Data Integration

#### Skills & Abilities Required<sup>6</sup>:

- Problem Sensitivity: sensing when and where something goes wrong
- Programming: writing computer programs for various purpose
- Systems Analysis: determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes
- Deductive Reasoning: applying general rules to specific problems to produce answers that make sense.

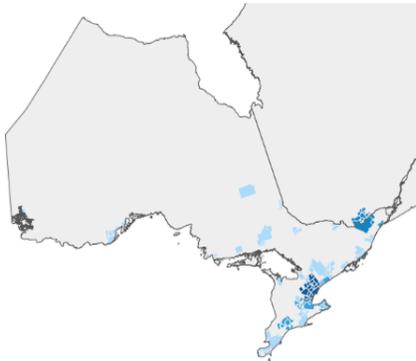
<b>24,398</b> <b>Jobs<sup>7</sup> (2015)</b> 40% above Canada's average	<b>10.8%</b> <b>% Change (2016-2024)</b> Canada: 12.0%	<b>\$45.55/hr</b> <b>Median Hourly Wages<sup>8</sup></b> Canada: \$42.81/hr
---	--	---

### Ontario Trends



Region	2016 Jobs <sup>7</sup>	2024 Jobs <sup>7</sup>	Change	% Change
● Ontario	24,994	27,704	2,710	10.8%
● Canada	46,742	52,357	5,615	12.0%

## Where are the most jobs in Ontario for Software Engineers and Designers?



Census Metropolitan Aggregate	2024 Jobs <sup>7</sup>
Toronto	16,116
Ottawa - Gatineau	7,158
Kitchener - Cambridge - Waterloo	1,379
Hamilton	700
Oshawa	272

## Who are employing Software Engineers and Designers?

Industry	Occupation Jobs <sup>7</sup> in Industry (2015)	% of Occupation in Industry (2015)	% of Total Jobs <sup>7</sup> in Industry (2015)
Computer systems design and related services	7,863	32.2%	8.9%
Scientific research and development services	2,614	10.7%	8.9%
Software publishers	2,467	10.1%	15.8%
Computer and communications equipment and supplies merchant wholesalers	1,769	7.3%	5.6%
Communications equipment manufacturing	624	2.6%	6.8%



## Reference and Notes

---

<sup>1</sup> <https://brocku.ca/webcal/2016/undergrad/csbu.html>

<sup>2</sup> <https://brocku.ca/webcal/2015/undergrad/cncc.html>

<sup>3</sup> <https://brocku.ca/game/game-programming>

<sup>4</sup> Location Quotient: a calculation that quantifies the concentration of a particular industry, cluster, or occupation, in a Ontario as compared to the Canada. It can reveal what makes a particular Ontario “unique” in comparison to the Canada’s average. Source: <http://www.economicmodeling.com/2011/10/14/understanding-location-quotient-2/>

<sup>5</sup> <https://brocku.EmsiCareerCoach.ca>

<sup>6</sup> <https://www.onetonline.org/>

<sup>7</sup> Employment numbers do not include people who are self-employed and may be under-represented.

<sup>8</sup> Wages do not consider people who are self-employed and may be under-represented.