Update

The Digital Workforce

Rapid Expansion of U.S. Core IT Work Force to Continue
Latest Projections Bring Number to Nearly 4 Million by 2008

The Office of Technology Policy analyzed Bureau of Labor Statistics' growth projections for the core occupational classifications of IT workers—computer engineers, systems analysts, computer programmers, database administrators, computer support specialists and "all other computer scientists"—to assess future U.S. demand.
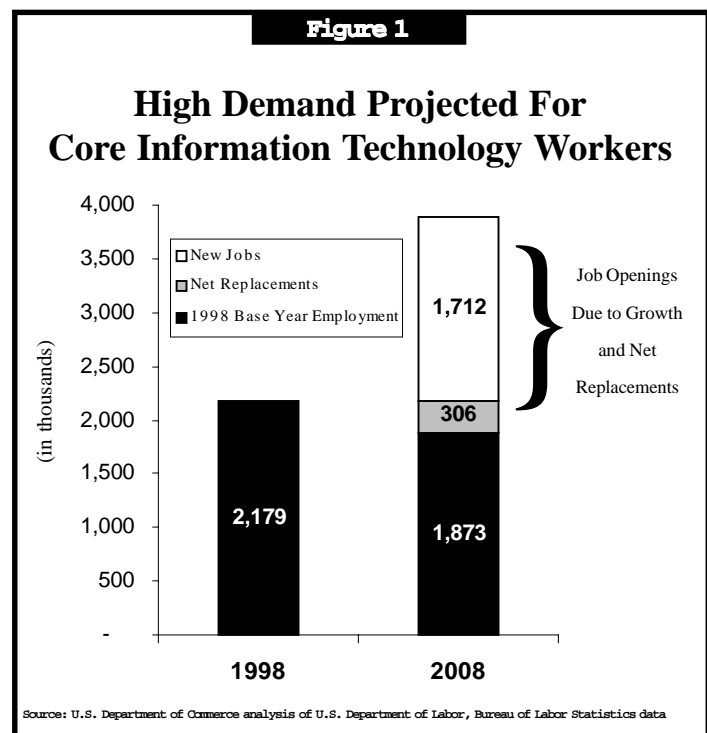
OTP analysis of BLS data indicates there were 2,179,000 core IT workers in 1998 with projected growth bringing the number to 3,891,000 by 2008. Additionally, the United States will need to replace 306,000 workers who are leaving these occupations as a result of retirement, change of profession or other reasons. Accordingly, the United States will require more than 2 million new IT workers in these occupations during this ten year period—an average of about 201,800 per year. [Figure 1] Of these jobs, more than three-fourths (1,552,000) are classified as requiring at least a bachelor's degree, while less than a fourth (466,000) require an associate's degree.

Figure 2 (next page) shows 1998-2008 employment projections for each of the core IT occupations. Overall, on a percentage basis, the new 2008 projections are not very different from the 2006 projections. Between 1998 and 2008, new jobs for all core IT workers are expected to increase 78.7 percent. Notably, the five fastest growing occupations for the 1998-2008 period are core IT occupations:

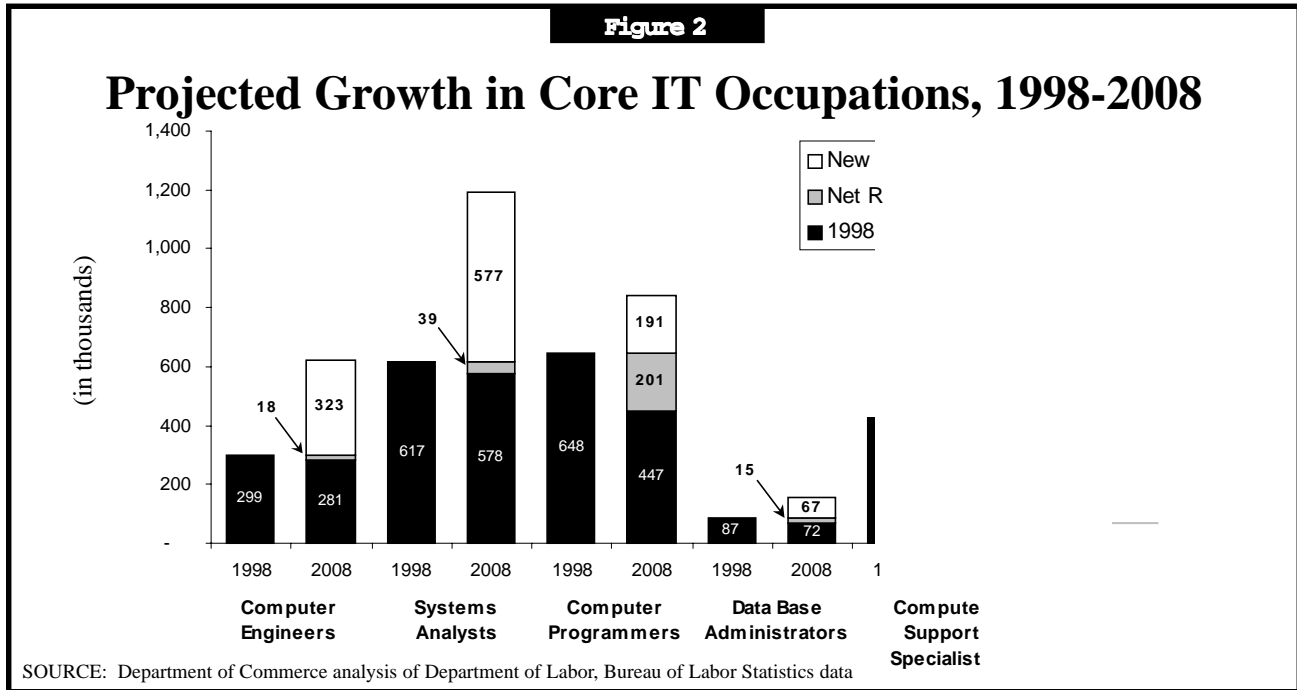|	
Database Administrators	77.2 %
Systems Analysts	93.6 %
Computer Support Specialists	102.3 %
Computer Engineers	107.9 %
All Other Computer Scientists	117.5 %

These growth rates compare to a projected increase of 14.4 percent for all occupations. Even the slowest growing core IT occupation, computer programmers, is expected to grow by 29.5 percent, more than twice the average for all occupations.

Systems analysts have the largest job growth of all occupations with a projected increase of 577,000, from 617,000 in 1998 to 1,194,000 in 2008, while the number of computer engineers is expected to grow 323,000 from 299,000 in 1998 to 622,000 in 2008. And though the number of computer pro-grammers is expected to grow a comparatively modest 191,000 (from 649,000 in 1998 to 839,000 in 2008), 201,000 new computer programmers will be required to replace those exiting the occupation.

Figure 1

High Demand Projected For Core Information Technology Workers

Legend: New Jobs; Net Replacements; 1998 Base Year Employment

1998: 2,179
2008: 1,873; 306; 1,712

} Job Openings Due to Growth and Net Replacements

(in thousands)

Source: U.S. Department of Commerce analysis of U.S. Department of Labor, Bureau of Labor Statistics data

NOTE: *The 1998-2008 projections incorporate survey coverage changes in the Occupational Employment Statistics (OES) Survey upon which BLS employment projections are based. As a result, the 1996-2006 and 1998-2008 employment projections are not strictly comparable for all categories of workers. Details on the changes and their impact on the current and projected counts of core IT workers can be found on page 4.*

Previously, BLS counted computer scientists in aggregate. Viewed this way, the 1998-2008 projections for computer scientists (including database administrators, computer support specialists, and "all other computer scientists") would have the largest growth in jobs of all occupations, rising from 613,000 in 1996 to 1,236,000 in 2008, an increase of 621,000. The vast majority (439,000) of the increase in computer scientists is in the subcategory of computer support specialists, which BLS classifies as requiring only an associates degree, whereas BLS classifies each of the other core IT occupations as requiring bachelors degrees. The number of computer support specialists is projected to rise from 429,000 in 1998 to 869,000 in 2008. The number of database administrators is projected to grow from 87,000 to 155,000 during this period, while the number of "all other computer scientists" is projected to grow from 97,000 to 212,000.

Figure 2

Projected Growth in Core IT Occupations, 1998-2008

SOURCE: Department of Commerce analysis of Department of Labor, Bureau of Labor Statistics data

The service sector (not including transportation, public utilities, finance, insurance, real estate, and wholesale and retail trade) is expected to absorb the lion's share of all increases in these core information technology occupations. [Figure 3] By 2008, the service sector is expected to increase its employment of computer systems analysts, scientists, and engineers by 155 percent and computer programmers by 55 percent, or an overall core IT worker growth rate of 147 percent. In contrast, the number of computer scientists and engineers and systems analysts in the manufacturing sector is expected to grow much more slowly (32 percent), while the number of computer programmers is expected to decrease by about 21 percent.

Certain industries are more IT worker intensive than others and thus, would be more affected by tight IT labor markets [Figure 4]. And the IT worker intensity of each of these industries is projected to grow through 2008. In the most IT worker intensive industry—computer and data processing services—it is projected that, by 2008, 49.7 percent of the industry's employees will be computer programmers, systems analysts and computer scientists and engineers.

However, IT worker intensity does not tell the whole story. The size of an industry's IT work force is an important consideration. For example, while the wholesale trade industry is projected to be less IT worker-intensive in 2008

Figure 3

Projected Core IT Occupation Growth by Industrial Sector, 1998-2008

SOURCE: Department of Commerce analysis of Department of Labor, Bureau of Labor Statistics data

than many other industries, the sheer size of its IT work force (135,608) would make tight markets for computer programmers, systems analysts, and computer scientists and engineers a troubling problem. When IT worker intensity and size of IT work force are taken together, a picture emerges as to which industries' competitive performance would be most adversely affected by difficulties hiring highly skilled IT workers [Figure 5]. The computer and data processing services industry stands out starkly as an industry with much at stake in the supply of IT workers.
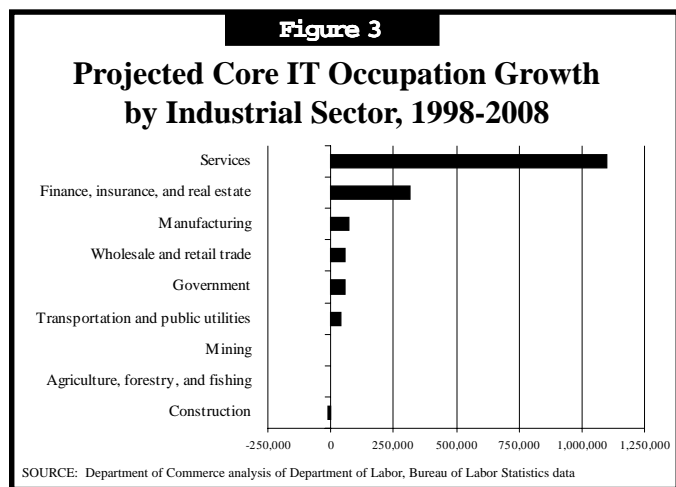

Figure 4

Industry IT Worker Intensity*

	1998			2008	
Rank	**Industry**	**%**	**Rank**	**Industry**	**%**
1	Computer and data processing services	41.4%	1	Computer and data processing services	49.7%
2	Computer and office equipment	16.1%	2	Computer and office equipment	18.4%
3	Guided missiles, space vehicles, and parts	12.0%	3	Telegraph and communication services, nec	15.5%
4	Telegraph and communication services, nec	11.9%	4	Guided missiles, space vehicles, and parts	13.6%
5	Life insurance	9.4%	5	Life insurance	11.8%
6	Management and public relations	7.0%	6	Security & commodity exchanges & services	8.4%
7	Holding and other investment offices	6.0%	7	Management and public relations	8.1%
8	Security & commodity exchanges & services	6.0%	8	Holding and other investment offices	8.0%
9	Research and testing services	6.0%	9	Research and testing services	7.2%
10	Search and navigation equipment	6.0%	10	Search and navigation equipment	6.7%
11	Telephone communications	5.5%	11	Telephone communications	6.6%
12	Communications equipment	5.2%	12	Communications equipment	6.6%
13	Measuring and controlling devices	5.1%	13	Fire, marine, and casualty insurance	6.5%
14	Fire, marine, and casualty insurance	4.5%	14	Medical service and health insurance	6.0%
15	Medical service and health insurance	4.2%	15	Measuring and controlling devices	5.8%
16	Miscellaneous publishing	4.0%	16	Crude petroleum, natural gas, and gas liquids	5.2%
17	Pension funds and insurance, nec	3.8%	17	Federal government	5.1%
18	Engineering and architectural services	3.7%	18	Miscellaneous publishing	4.7%
19	Federal government	3.7%	19	Banking and closely related functions, nec	4.7%
20	Crude petroleum, natural gas, and gas liquids	3.7%	20	Engineering and architectural services	4.5%

* Percent of industry workers that are computer scientists, computer engineers, computer programmers and systems analysts. nec = not elsewhere classified
SOURCE: Department of Commerce analysis of Department of Labor, Bureau of Labor Statistics data

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Figure 5

Projected 2008 IT Worker Intensity vs. Size of IT Work Force for Selected Industries
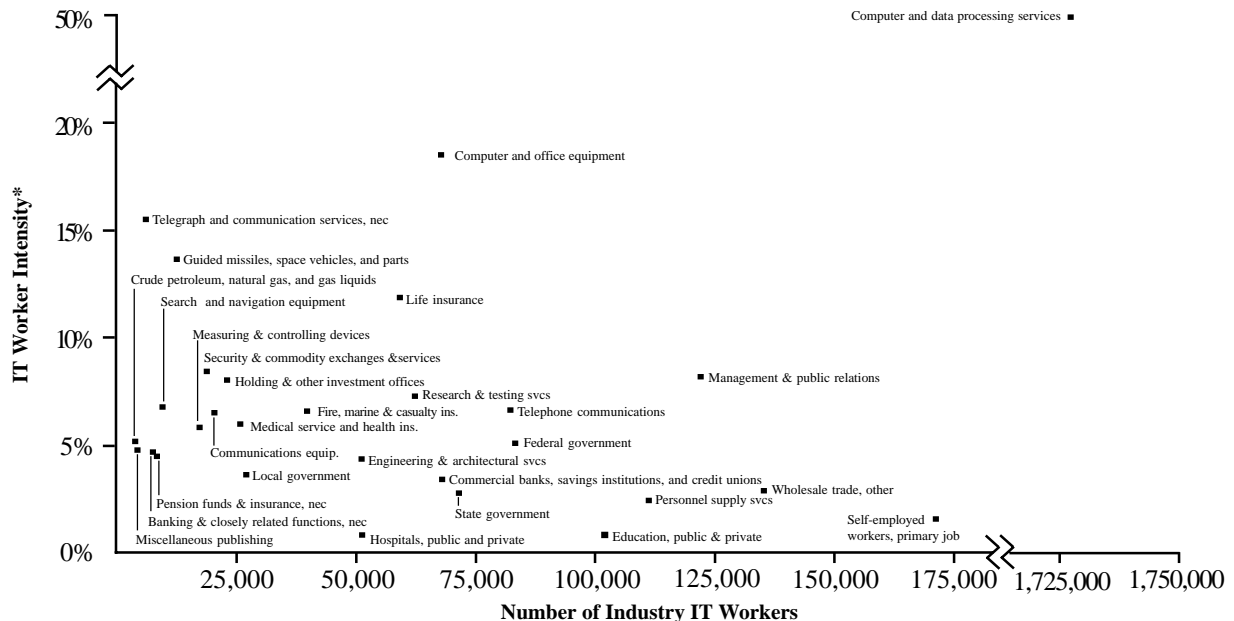
* "IT Worker Intensity" is the percentage of a given industry's workers that are computer scientists, computer engineers, computer programmers & systems analysts.
^ "Stategovernment" and "Local government" numbers do not include education or hospital employees.
SOURCE: Department of Commerce analysis of Department of Labor, Bureau of Labor Statistics data

How Do the States Stack Up in IT Employment?

The Office of Technology Policy will be releasing ***The Digital Work Force: State Data and Rankings*** in September 2000. This update* will provide state data and rankings for each of the core IT occupations, including: the number employed, the average annual wages and the IT worker intensity (the share an occupation comprises of a state's work force). Here is a sampling from this report:

	Rank	Size of Work Force	Intensity	Average Annual Wages
All Core IT Occupations	1	California	Colorado	N/A**
	2	Texas	Virginia	N/A**
	3	New York	Massachusetts	N/A**
Computer Engineers	1	California	Massachusetts	Massachusetts
	2	Texas	Colorado	District of Columbia
	3	Massacusetts	Virginia	Oregon
Computer Programmers	1	California	Virginia	New Jersey
	2	New York	Maryland	California
	3	Texas	New Jersey	Massachusetts
Systems Analysts	1	California	Virginia	New Jersey
	2	Texas	Maryland	Colorado
	3	New York	Delaware	Virginia
All Other Computer Scientists	1	California	Colorado	Maryland
	2	New York	Minnesota	Delaware
	3	Illinois	Delaware	Pennsylvania
Database Administrators	1	California	District of Columbia	New York
	2	Texas	Colorado	New Jersey
	3	New York	Virginia	California
Computer Support Specialists	1	California	North Dakota	New Jersey
	2	Texas	Colorado	Connecticut
	3	New York	Washington	New York

* Analysis based on 1998 Occupational Employment Statistics survey data from the U.S. Department of Labor, Bureau of Labor Statistics
** N/A => Data not available.

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Methodological Changes Between the 1996-2006 Projection and the 1998-2008 Projection

In its 1998-2008 projections, the Bureau of Labor Statistics data reflect survey coverage changes in the Occupational Employment Statistics (OES) Survey upon which the agency's employment projections are based. Consequently, 1996-2006 and 1998-2008 employment projections are not strictly comparable for all categories of workers. In particular, the 1998-2008 employment projections contain changes that significantly affect current and projected counts of "core" IT workers.

First, unlike the 1996-2006 projections, BLS now provides subcategory counts for the three kinds of workers included in its "catchall" occupation category "database administrators, computer support specialists, and all other computer scientists." In our June 1999, The Digital Work Force: Building Infotech Skills at the Speed of Innovation, these subcategories were captured collectively as "computer scientists."

Second, growth in occupations between the two base years—1996 and 1998—reflects both real growth an methodological changes. The 1998-2008 projections substantially boost the number of workers included in the "catchall" occupation category from 212,000 in 1996 to 613,000 in 1998, an increase of nearly 190 percent. The newly available 1998 breakouts count 87,000 "database administrators," 429,000 "computer support specialists," and 97,000 "all other computer scientists." According to BLS, the vast bulk of the increase in the "catchall" category from 1996 to 1998 is due to the reclassification of workers as "computer support specialists" and only marginally due to actual growth in the numbers of workers in the three subcategories between 1996 and 1998. According to BLS, reclassified "computer support specialists" were likely previously categorized as other kinds of computer professionals, computer operators, or "all other professional workers." As a consequence of this reclassification, "computer support specialists" comprise 70 percent of the "catchall" category in the 1998-2008 projections, whereas they comprised only a minority of the category in the 1996-2006 projections.