Author(s): Baravalle, Andres; Capiluppi, Andrea
Article title: IT jobs in UK: current trends
Year of publication: 2010
Citation: Baravalle, A., Capiluppi, A. (2010) 'IT jobs in UK: current trends'. Proceedings of the 3rd IEEE International Conference on Computer Science and Information Technology (IEEE ICCSIT) 2010, Chengdu, China, July 2010.

It jobs in UK: current trends

Andres Baravalle
CITE, University of East London
London, UK
a.baravalle@uel.ac.uk

Andrea Capiluppi
CITE, University of East London
London, UK
a.baravalle@uel.ac.uk

***Abstract*—Part of the role of universities is, today as from their earlier times, to prepare students for a productive role in the society. In this context, the role of curriculum development is to ensure that students are able – if so they wish – to acquire skills that are in demand in the work market. This is of uttermost importance in areas as IT where weak choices by students and/or universities might have repercussions in the employability at the end of the academic studies. This paper aims to discusses and a discuss and analyse what are the requirements of the job market, now, today, for IT workers in UK and to provide a meaningful starting point to support curricula development in UK.**

Keywords: IT, UK, jobs, SFIAPlus

I. INTRODUCTION

According to UCAS [1], in 2009 a total of 477,277 students had a place confirmed in a UK university, 18,239 (3.8%) of which were in the categories Computer Science (11,328), Information Systems (3,165), combinations of Mathematics and Computer Science (2,229), Software Engineering (1,466), Artificial Intelligence (51).
Today, the economy is in deep crisis and unemployment is soaring; unemployment in the age band 18-24 has reached 746,000 [2] in the period Jul-Sep 2009.
In this context, UK universities face the responsibility to effectively interface with the market, understanding what are the skills that are missing in the market and how can they be delivered.
The SFIAPlus framework [3], developed by the British Computing Society (BCS) over the past 20 years, has already been at least partially successful in identifying the skills that are needed by UK companies. As a starting point of the SFIAplus framework there are the requirements of UK IT companies, as expressed by them and collected by the BCS with peer discussion groups, interviews, panels etc over the years. The result is a list of high level skills, hierarchically organised that can be used by employers, professionals, educators for their different aims. Employers can use the SFIAPlus framework to create job profiles (e.g. when recruiting); educators can use it to describe their academic programmes, and professionals can use it to match their skills to market requests, and to plan their development path.

While the importance of the SFIAPlus framework is not under discussion, this paper aims to analyse the problem with a finer granularity.

The thesis of this paper is that employers are not looking for someone with generic "Software development" skills (one of the SFIAplus categories), but for specific skills such as Java, .NET or C++ developers (just to give an example), and in that context we aim to provide a in-depth analysis of the IT job market in UK on timespan of about 5 months, from mid-September 2009 to early February 2010.
This paper will discuss and analyse what are the requirements of the job market, now, today, for IT workers in UK.
Hopefully this will allow us to understand what are the areas currently shaping the expansion of IT in UK

II. METHOD

To answer our main question ("*What are the areas currently shaping the expansion of IT*") we have decided to:

1. Create a databank as extensive as possible of IT job listings in UK;
2. Analyse the job listings ;
3. Group the job listings in a selection of categories.

The first step has been to identify the sources for this study. We have decided from the beginning that we were going to consider only job listings that were featured on-line on dedicated search engines. While many prospective workers do not use the internet for job hunting, it was thought that IT workers and recruiters were both most likely to use the Internet. Moreover, an in-depth analysis of the job adverts in the press would have required a level of manpower that we were not able to commit at this stage.
Focusing on on-line job adverts only allowed us to be able to create an extensive databank and to have significant quantitative data to analyse. While there are many employment web sites, no definitive study has been conducted on their respective market share.
With regards to the US market, according to comSocre, a specialist in measuring the digital word, the web sites which catch most of the traffic are (in order of importance) are CareerBuilder.com, Monster.com and Yahoo! HotJobs [4].

There are no comparable existing studies of the U.K. market share of the different employment web sites.
A preliminary study focused on the identification of appropriate sources for UK, considering CareerBuilder.com, Monster.com, Yahoo! HotJobs, the Guardian and the Times. CareerBuilder.com was immediately discarded as it mostly focused on the US market. Yahoo! HotJobs, while addressing the UK market, was discarded for technical reasons. Yahoo! HotJobs does not have a separate IT category but only a far more inclusive "Technology" category with no subcategories. Moreover, Yahoo! HotJobs does not have an internal archive of jobs, but indexes external job listings; the implication is that the jobs are in very different formats and it would have been challenging to create generic technology that would have been able to analyse such different sites.
Monster.com is at the first or second position in the world for number of users and number of jobs posted (depending on the sources used). Powered by Open Source library Lucene, at the time of writing, Monster had 150 million resumes and over 63 million job seekers per month (Lucid Imagination, n.d.). About 4,000 IT jobs were simultaneously on-line in Monster UK at the time of our research, which made it the most important player in the market under evaluation. The other major players in the UK online job advertisement market include the Guardian (about 150 IT jobs) and the Times (about 70 jobs). Given the fact that Monster greatly outnumbers the other advertisers, and considering the great effort needed for the development of the software used for the data collection, it was decided that at this stage only data from Monster UK would have been collected and analysed. While it is a limitation, this nevertheless provides a good starting point for our analysis.
Once the source for our data was identified, the next step was the data collection.
To proceed, we decided to develop customised analysis software, to allow us to automatise the data collection. At this stage, it is worth noting that we decided from the beginning not to look for jobs in the web in general, as we felt that the advantages of such approach were outweighed by the exponentially higher costs in terms of software development and by the computation resources for data mining.

A. Architecture

The software developed for this research includes an ad-hoc web **spider**, a **data extractor** module and a basic **entity recognizer** component (see Figure 1).

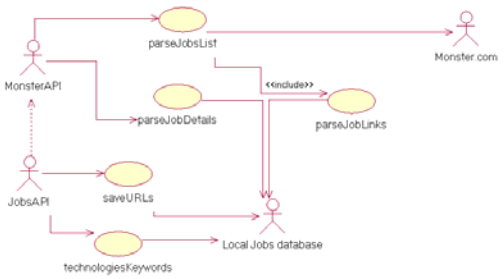

Figure 1 - Use case diagram

While only the Monster spider has been fully developed, the system has been developed with extension in mind and further modules can be plugged in if required or desired.

The **spider** is in charge of downloading all the raw data from Monster.com. Jobs in Monster.com are organised in hierarchical categories, and only the jobs in the IT categories have been downloaded. The limited processing power of our equipment and compliance with netiquette rules led us to decide to minimise the interaction with Monster.com and the overload to their resources. After a trial and error phase, we identified a suitable number of "runs" per day: the software runs 7 times per day looking for new jobs, and 4 times per day re-parsing the full catalogue.
Running the spider several times per day allows us to minimise the risk of missing any job listings, and to be able to obtain timely dates for the removal of the jobs.
The **data extractor** is in charge of processing and categorising the raw data. Its first function is to identify and discard corrupted or incomplete data (e.g. "dummy" or "test" job listings), and then to extract the most relevant information: job title, company, location, industry, type of job, career level, job URL, salary and description. This is done using regular expressions.
The final component, the **entity extractor**, extracts a list of Information Technologies from the job listings. This component is the one that allows us to contribute with a tentative answer on the question "*What are the areas currently shaping the expansion of IT in UK*".
A set of regular expressions and a gazette are used to extract IT technologies names from job listings.
The spider, the data extractor and the entity recognizer all run through cron jobs, several times per day, to minimise the load on Monster.com and on the server who hosts the scripts itself.
A set of scripts, running against the databank, are used as a final filter to extract the relevant information. A human analysis is then performed to ensure the correct identification of IT terms and to group the job listings in appropriate categories.

III. ANALYSIS

At this stage, the spider has been running for just over 5 months, collecting and analysing more than 48,000 jobs in the selected category.

A. IT Jobs

Our first step was to analyse the job listings, to look for any trends in the selected timeframe. To do that, we took two snapshots of the information, one after 3 months and the other at the end of the research.

Table 1 lists the first 30 IT keywords by number of occurrences in the sample, as sampled in the second week of December 2009. Table 2 is a second snapshot, taken in the second week of February 2010.

Table 1 - Top 30 Information Technologies skills by job listings (December 2009)

Keyword	Occurrences	Position
Microsoft	4201	1
.NET	3691	2
Java	3435	3
HTML	3083	4
JavaScript	2894	5
XML	2692	6
ASP.NET	2641	7
C++	2305	8
Linux	2199	9
PHP	1983	10
MYSQL	1500	11
ITIL	1294	12
XHTML	1109	13
Photoshop	982	14
VB.NET	960	15
Sharepoint	938	16
CRM	929	17
J2EE	873	18
TCP/IP	819	19
UML	764	20
SEO	672	21
VMware	606	22
Citrix	566	23
PRINCE2	554	24
MCSE	514	25
ActionScript	429	26
PL/SQL	407	27
Dreamweaver	403	28
SOA	400	29
MVC	397	30

Table 2 - Top 30 Information Technologies skills by job listings (February 2010)

Keyword	Occurrences	Position	Performance
Microsoft	6366	1	↔
.NET	5616	2	↔
Java	5040	3	↔
HTML	4837	4	↔
JavaScript	4542	5	↔
XML	3991	6	↔
ASP.NET	3912	7	↔
Linux	3449	8	↑ (9)
C++	3289	9	↓ (8)
PHP	2974	10	↔
MYSQL	2368	11	↔
ITIL	2150	12	↔
XHTML	1706	13	↔
CRM	1543	14	↑ (17)
Photoshop	1488	15	↓ (14)
VB.Net	1443	16	↓ (15)
Sharepoint	1426	17	↓ (16)
J2EE	1288	18	↔
TCP/IP	1232	19	↔
UML	1160	20	↔
SEO	948	21	↔
VMWare	934	22	↔
Citrix	881	23	↔
Prince2	864	24	↔
MCSE	778	25	↔
JQuery	652	26	↑ (new)
ActionScript	646	27	↓ (26)
XSLT	637	28	↑ (new)
MVC	626	29	↑ (30)
PL/SQL	613	30	↓ (27)

The first thing that we can note is how the two tables show that the request for specific skills has been quite constant in the selected timeframe. Most of the skills didn't change position in the listing at all, and the ones that did change position only climbed or fell a few steps.

- With regards to the **software platforms**, there are some clear indicators on the UK market:
- Microsoft-specific technologies are predominant in the IT market. The .NET framework is the most requested technology, and ASP.NET and VB.NET are both individually present in the first 30 positions;
- Sun technologies (Java, J2EE) are also featured prominently;
- Linux is nevertheless one of the most requested skills, and its request is slightly going up, proportionally.

While Microsoft is clearly predominant, the request for such a (comparably) high number of professionals with experience in Linux seems to be an indicator that those skills might be in shortage in UK.

From just looking at the numbers, it's quite visible that **server side web technologies** appear in the top positions: ASP.NET , PHP, J2EE; similarly significant is the fact the order in which they appear.
Design-related technologies also feature prominently (HTML, XHTML, Photoshop, ActionScript, Dreamweaver) , with HTML as one of the most desired skill.
Programming skills are featured across the full list and C++ is specifically featured.

B. Server-side web development

The next step was to analyse the performance of different technologies for web development. We have focused our analysis on .NET, PHP and J2EE, again using two snapstots.

Table 3 - Server side web development

Technology	Occurrences (December 2009)	Occurrences (February 2010)	Performance (percentage increase in new jobs)
ASP.NET combinations			
ASP.NET and SQL Server	1,850	2,674	44.54%
ASP.NET, SQL Server and IIS	239	347	45.19%
ASP.NET and Oracle	225	321	42.67%
ASP.NET and MySQL	181	245	35.36%
PHP combinations			
PHP and MySQL	1,150	1,730	50.43%
PHP, MySQL and Apache	315	477	51.43%
LAMP (Linux, Apache, PHP, MySQL) [1]	255	386	51.37%
WAMP (Windows, Apache, PHP, MySQL)[2]	46	75	63.04%
PHP and SQL Server	207	283	36.71%
PHP and Oracle	114	176	54.39%
PHP, MySQL and Oracle	60	109	81.67%
J2EE combinations[3]			
J2EE and Oracle	468	677	44.66%
J2EE and SQL Server	132	191	44.70%
J2EE and MySQL	119	189	58.82%
J2EE, Tomcat and MySQL	43	72	67.44%

Table **3** shows how Microsoft technologies for server-side web development are clearly more in demand than the other two more common alternatives: PHP and J2EE.
At the same time, it shows a number of interesting facts:

- The percentage increase in jobs on Microsoft technologies is the lowest, comparing both with PHP and with J2EE
- Less preferred combinations of skills are increasing slower than the preferred combinations (e.g. ASP.NET and MySQL and PHP and SQL Server)
- Demand for PHP+Oracle skills has greatly increased. This is likely to be due to an expansion of PHP into sectors where Oracle is used (rather than the other way around).

It is interesting to compare it with Netcraft's survey of Web servers [5]. Apache, after losing market almost continuously since October 2005, has started to regain market positions. IIS has been increasing its market share till October 2008, and decreasing afterwards.

C. Operating Systems

Many IT jobs require experience in one or more operating systems. This is the case for example in system administration or helpdesk positions. This section analyses operating system skills named in the job adverts.

Table 4 - Operating systems

[1] Not counting the job offers with the word "Lamp", but with the individual words Linux, Apache, PHP and MySQL

[2] Not counting the job offers with the word "Wamp", but with the individual words Windows, Apache, PHP and MySQL

[3] Query included the keywords J2EE, Servet and JSP to try to capture a better picture of the context.

Operating system	Occurrences (December 2009)	Occurrences (February 2010)	Performance (percentage increase in new jobs)
Microsoft operating systems			
Windows XP	488	818	67.62%
Windows Server 2003	285	433	51.93%
Windows Vista	35	55	57.14%
Windows Server 2008	61	96	57.38%
Windows 7	47	98	108.51%
Generic Windows	4560	6872	50.7%
Linux			
RHCE	48	67	39.58%
Ubuntu	39	58	48.72%
SUSE	68	95	39.71%
OpenSUSE	1	1	0.00%
Fedora	27	42	55.56%
Debian	75	107	42.67%
Unspecified Linux distribution	2605	4011	53.97%
Unix and Unix-like			
Solaris	570	839	47.19%
IRIX	8	9	12.50%
AIX	239	361	51.05%
Unix-like			
OpenSolaris	0	2	
OpenBSD	5	8	60.00%
FreeBSD	13	19	46.15%
NetBSD	1	1	0%
Mac			
Mac OS X	32	46	43.75%

Our research shows that recruiters tend not to specify specific versions of operating systems. Table 4 shows how "Microsoft Windows" and "Linux" are both named in thousands of adverts, while specific versions only in tens or hundreds.

With regard to serve oriented operating systems, the following has been observed:

- Linux, is clearly far more popular that Microsoft Windows. SUSE and Debian are the distributions that are more popular.
- Solaris is also very popular, and it outperforms all (individual) Linux distributions and Windows Server versions.
- Windows Server 2003 is by far the operating systems featuring in more ads, but the share of ads for Windows Server 2003 plus Windows Server 2008 is less than both Linux and Solaris.
- Unix-like operating systems have a very small percentage of the market.

IV. Discussion

Government statistics [6] suggest that 76% of the UK adult population has regular access to Internet and 70% of the population does have internet access from home. We are aware that this approach can be used to monitor on-line job listings only, and is limited to analysing the opportunities of job seekers with Internet access. That said, it is a reasonable assumption to expect that prospective workers in IT have some level of Internet access and use Internet for job seeking. In future, further research might provide more detailed information on this aspect.

A second limitation is that this research does not consider printed job posts. While jobs might be both in the printed press and on-line, a number of job posts will be listed in the printed press only. They are not suitable for any kind of quantitative analysis as the one that has been carried for this paper with the resources available to the authors.

This work, while of merit on its own, opens a number of possible research directions in the study of evolution of company needs.

At this stage, a satisfactory software infrastructure is already developed and that would analysts allow to:

- Monitor what type of jobs are more required by UK companies, and how it changes in time
- Monitoring what type of academic or professional qualifications – if any at all – are more required by UK companies
- Monitoring the ups and downs of the market

It is worth noting that the architecture that has been used to develop the research at the base of this paper is active and in place, and a number of possible reasearch directions are open:

- Extending the research to more areas of IT
- Replicating the research to areas other than IT
- Extending the number of sources monitored (e.g. monitoring other web sites that do include job postings, as the Guardian's one)
- Ex-postea interviews with companies that have posted adverts on-line, to analyse whether they are satisfied or not.

- Curriculum shaping: we are considering to compare what the companies are looking for to what the universities are offering in their degree course modules. The drawback would be that it's often hard to understand what a module is about from the text describing it.

Hopefully this would allow us to improve our understanding of the IT market in UK, with positive effects in academic planning and practice.

REFERENCES

[1] UCAS. (2009) Provisional final figures for 2009. [Online]. http://www.ucas.com/about_us/media_enquiries/media_releases/2009/2009-10-21

[2] Office for National Statistics. (2009) Labour Market Statistics Statistical Bulletin - November 2009. [Online]. http://www.statistics.gov.uk/pdfdir/lmsuk1109.pdf

[3] SFIA. Framework reference. [Online]. http://www.sfia.org.uk/cdv3/ai1005484.html

[4] comScore. (2009) Job Search Ranks As Fastest Growing U.S. Online Category In 2008. [Online]. http://comscore.com/Press_Events/Press_Releases/2009/1/Job_Search_Fastest_Growing/%28language%29/eng-US

[5] Netcraft. (2009) November 2009 Web Server Survey. [Online]. http://news.netcraft.com/archives/web_server_survey.html

[6] Office for National Statistics. (2009) Internet Access. [Online]. http://www.statistics.gov.uk/cci/nugget.asp?ID=8

[7] e-skills UK. (2008) ICT Inquiry. [Online]. http://www.e-skills.com/Research-and-policy/ictinquiry/1057

[8] Office of Government Commerce, *Managing Successful Projects with PRINCE2: 2009 Edition*.: Stationery Office Books, 2009.

[9] SFIAplus. SFIAplus4. [Online]. http://scripts.bcs.org/sfiaplus/sfia.htm

[10] Lucid Imagination. Monster. [Online]. http://www.lucidimagination.com/Community/Marketplace/Application-Showcase-Wiki/Monster