Curriculum Vitae

Personal Details

Name:	John Brush
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Profile

Java architect specializing in framework design, programming and modeling language tools, domain specific languages, UML modeling and systems engineering.

Key Qualifications

- Sun Certified Enterprise Architect for Java Platform Enterprise Edition
- Sun Certified Programmer for the Java 2 Platform
- Expert knowledge of the Java programming language and execution environment
- Extensive experience designing and implementing domain specific languages in both Java and UML
- Twenty years experience in education and finance: Zürich University of Applied Sciences (ZHAW), Swiss Federal Institute of Technology (ETH), UBS, Credit Suisse, Zürich Cantonal Bank, Swisslife and SBB (Swiss Federal Railways)
- Bilingual: fluent in German and English
- Highly self-motivated, perform well under pressure, thrive on challenges, excel at finding creative and elegant solutions to difficult problems

Accomplishments

- Started several open source projects as part of the Liquid Mind initiative[1].
- Presentation[2] for Comerge (www.comerge.net) on Inflection (June 2016).
- Guest lecture for students of Thomas Keller at the School of Management and Law of the Zürich University of Applied Sciences entitled: "Requirements Engineering in Project ExpAct" (June 2015).
- Completed course[3] by the Zürich School of Management and Law (ZHAW) on Entrepreneurship and Business Creation (October 2013).
- Guest lecture for PhD students of Thomas Gross at the Laboratory for Software Technology, ETH, Zürich, entitled: "A Programming Model for Long-Running Business Processes" (October 2012).
- Talk for the Java User Group Switzerland (JUGS) entitled: "SUN Certifications: Experience Report" (August 2003)
- Talk for Java User Group Switzerland, entitled: "Experience report: Developing with VMware and Java" (September 2001)

Online Resources

[1] The Inflection API. https://youtu.be/CFK4l2JBCVI
[2] An Object Oriented Business Process Engine for Java. https://youtu.be/S82a2b2FPBg
[3] Liquid Mind landing page. www.liquidmind.ch
[4] Liquid Mind on GitHub. github.com/liquid-mind
[5] Example UML Architecture. www.liquidmind.ch/doc/ripples.zip
Curriculum Vitae Full. www.liquidmind.ch/doc/johnbrush-cv-full.pdf
Curriculum Vitae Short (this document). www.liquidmind.ch/doc/johnbrush-cv-short.pdf

Details

Open Source Projects

Lead Developer, Founder September 2016 to present
Ripples (github.com/liquid-mind/ripples)

Alternative to Java reflection that addresses some of its legacy issues while introducing a number of UML-inspired, higher-level concepts and allowing meta-data to be extracted from both binary and source code:

- Elimination of redundancies due to historic developments, such as java.lang.Method's getReturnType() and getGenericReturnType().
- Built-in support for JavaBean properties; these are now part of the alternative reflection model itself.
- Support for associations including ideas such as aggregation, multiplicity, navigability, subsetting and redefinition.
- Collections and maps are treated specially, allowing users to easily find out the type of the class at the opposing end of a given association.
- Built-in dependency analysis between classes, packages, jar files, etc.
- Ability to link classes lazily which allows, e.g., for classes with unresolvable dependencies to be loaded.
- Notion of a classifier as a means of disambiguating the term "class", which in Java is used either in the sense of any type that inherits from java.lang.Object or any non-generic type (i.e., any type that is an instance of java.lang.Class).

Lead Developer, Founder December 2014 to July 2015
Inflection (github.com/liquid-mind/inflection)

Introduces the notion of class views to Java as a way of adapting class models to specific use cases. Highlights of the implementation include:

- Domain specific language for declaring views of classes, written in ANTLR (Another Tool for Language Recognition).
- Introduction of taxonomies as a set of related views. System supports reuse by allowing more specific taxonomies to inherit from more general taxonomies.
- Loading and linking mechanism that allows for compiled taxonomies from multiple jar files to be used in a single application (analogous to class loading).
- Seamless integration of class views into the Java type system by allowing objects to be cast from classes to views and back again.

Lead Developer, Founder March 2012 to January 2015
Warp (github.com/liquid-mind/warp)

Provides persistent threads in Java as a way of seamlessly integrating slow agents (usually humans) into an orchestrating process. Concept was developed at the ETH in conjunction with Thomas Gross from the Laboratory for Software Technology. Highlights of the system include:

- Novel implementation of continuations in Java using byte code instrumentation to extract the normally inaccessible call stack state.
- Introduction of coroutines to Java by allowing users to define special "long-running" methods that automatically suspend the execution state of a thread to persistent storage while waiting for some external event to occur.
- Ability to restart a virtual machine without loosing the state of the running threads.
- Load balancing of persistent threads across multiple nodes.
- Recovery of long-running processes in cases of system failure.

Lead Developer, Founder July 2014 to December 2014
Deflector (github.com/liquid-mind/deflector)

Transforms Java checked exceptions into Java runtime exceptions by generating wrapper classes for arbitrary APIs in Java. The wrapper classes use static methods to delegate calls from and to the target API, wrapping exceptions as necessary. Checked exceptions, such as java.lang.IOException, for which there is no useful way to recover, may be handled by a small number of top-level handlers. This drastically reduces the amount of handlers spread throughout the code and makes wrapping exceptions by hand superfluous. It also makes bad programming practices, such as printing the exception and continuing, far less likely. Anders Hejlsberg, lead C# architect, sheds light on the problems with checked exceptions here: http://www.artima.com/intv/handcuffs.html.

Experience

Application Architect February 2014 to April 2017

Zürich University of Applied Sciences

Key Skills and Technologies

- Java, JAX-RS, Servlet, EJB, JAAS
- JPA, JTA/JTS, Hibernate, EclipseLink, Derby, MySQL
- UML, SysML, UML Profiling, DSL, OOA/OOD
- Magicdraw UML

- Lead architect and developer on several projects jointly undertaken with the EU and the Swiss Commission for Technology and Innovation (www.kti.admin.ch), including Faircare (social services for seniors, www.aal-europe.eu/projects/faircare/), ExpAct (job portal for seniors, www.aal-europe.eu/projects/expact), Pink Elephant (creative workshop tool) and CleanTech (directory of clean technology companies).
- Helped to form a cohesive working group out of a heterogeneous set of part-time assistants, students and full-time staff. Introduced formal design and development processes, formal specifications in UML, version control (git), code reviews and coding standards.
- Defined a formal introductory program for interns that included the design and implementation of a fictitious web shop using a self-written JSON serializer. Topics included lexing and parsing, working with servlet technologies, defining domain models, writing reusable frameworks, addressing non-functional requirements (i.e., security, scalability, etc.) and working with build and version control tools.
- Initiated the open source projects Deflector and Inflection (see section on open source projects) that were used as supporting frameworks in several applications.

Enterprise Architect February 2013 to November 2013

Belsoft AG, Zürich

Key Skills and Technologies

- Java, Swing, MagicDraw Open API, SNMP4J
- UML, SysML, UML Profiling
- Magicdraw UML, What's Up

- Designed a UML profile that allows customers to specify systems and processes at both the business and technical levels.
- Implemented SNMP synchronization software for automatically creating UML elements based on existing network infrastructure.
- Created plugin for MagicDraw UML that streamlines creating and maintaining allocations between business and technical infrastructure.
- Designed and implemented reporting front-end that combines live network data with service level requirements for the UML model to obtain high-level management reports of key performance indicators.

Application Architect March 2009 to August 2012

ETH (Swiss Federal Institute of Technology), Zürich

Key Skills and Technologies

- Java, JEE, JPA, JPQL, JMS, EJB, MVC
- Glassfish, Tomcat, Oracle, MySQL
- UML, SysML, OOA / OOD
- Magicdraw UML

- Designed and implemented a general purpose order management engine for applications that require configurable, order-based workflows. Features include registering, validating, authorizing, archiving, tracking and auditing orders. Standard modules address many common problems, such as ORM (JPA) integration, selection and synchronization of data, and front-end integration (JSF).
- Led the project "Kick-Start Java" whose goal was to establish the Java programming language and a Java-based development platform as standard. Introduced critical development practices, including design and code reviews, multi-level (unit / integration / system, etc.) testing and formal release and configuration management. Also provided extensive coaching for novice and intermediate Java developers.
- Co-lead of ETH's project DOI (Digital Object Identifier) which served as flagship for the order management engine.
- Analyzed the business objects and processes underlying ETH's current identity management system and created a target model based on identity management best practices. Special challenges included handling the fairly high semi-annual fluctuations of students, allowing for multiple isolated security domains and integration with a number of input and output systems.

Sabbatical in India August 2008 to February 2009
Brahmani Yoga, Goa

Completed the five hundred hour Yoga Alliance certified teacher training in Ashtanga Vinyasa yoga with Julie Martin at Brahmani Yoga (www.brahmaniyoga.com) in Anjuna, Goa.

Architectural Planer April 2007 to June 2008
Zürcher Kantonalbank, Zürich (Contract)

Key Skills and Technologies
- Sparx Enterprise Architect
- UML, SysML, SOA
- Visio, Powerpoint

In preparation for the merger of the logistics divisions of ZKB and BCV (Banque Cantonale Vaudoise), was assigned conceptual lead for defining a new domain-based architectural structure and methodology. Specific outputs included:

- An enterprise-wide, UML/SysML-based architectural model, capable of representing all relevant aspects - from requirements and business process models to the physical IT infrastructure, from IT-supported to organizational processes.
- A comprehensive technical integration architecture model, capable of representing any maturity level - from manual integration to full-blown service oriented architecture.
- Pilot application of architectural concepts to one of the top 20 ZKB projects, Reporting Services Investments, with subsequent fine-tuning and recognition of consequences for organizational processes and structure.
- A number of presentations on topics, including: UML & SysML, Unified Enterprise Model, Integration Architecture, Modeling Methodology and Organizational Structure.
- Coaching of key individuals, structuring of educational planning.

Application Architect November 2006 to March 2007
Zürcher Kantonalbank, Zürich (Contract)

Key Skills and Technologies
- Sparx Enterprise Architect
- UML, SOA
- Visio, Powerpoint

- Responsible for architecture of and activities surrounding two key integration platforms: Websphere Process Server and proprietary external connection integration platform.
- Established and maintained comprehensive architectural models, including business process and system views.
- Worked closely with project managers to assure smooth coordination between projects.
- Primary contact point from and to developers: established and oversaw the execution of concise quality standards regarding requirements management, development and testing.

Architectural Analyst November 2005 to September 2006
Credit Suisse, Zürich (Contract)

Key Skills and Technologies
- Java, JDBC, CORBA, EJB, JMS
- Weblogic, MQSeries, DB2, Oracle
- TCP/IP, IIOP(S), HTTP(S), SQLNET
- UML, OOA/OOD
- Visio, Subversion

- Documentation and analysis of all key systems within payments department, including applications written in Java, C/C++ and PL/1 and running in both PC and mainframe environments. The resulting UML diagrams proved to be highly useful tools for communication and planning.
- Developed a cost model to identify key cost drivers and estimate potential savings of various architectural options. This model demonstrated the cost advantages of moving to a more modern, Java-centric architecture.
- Constructed a comprehensive plan to iteratively migrate the existing legacy system-based application landscape to a more business-oriented, integrated and flexible architecture.
- Held presentation for key stakeholders highlighting the main points.

Configuration and Release Manager February 2005 to September 2005
Credit Suisse, Zürich (Contract)

Key Skills and Technologies
- UML, OOA/OOD, Design Patterns, MVC
- XML, XSL, XSLT, HTML, CSS
- Apache, Subversion, WEBDAV, TortoiseSVN
- Java, CORBA, EJB
- Visio, Perl, CVS

- Established a set of guidelines and processes to improve coordination with offshore partners. These were adopted by other projects within the same department (payments) as a baseline for organizing offshore collaboration. Topics covered include version control, change control, deployment and bug management.
- Created and maintained a UML overview of the project artifact dependencies as well as application, system and deployment architectures.
- Introduced a set of tools and processes for managing project documentation. Wrote several server-side scripts to validate files and associated meta-data. Configured document repository with WEBDAV/Delta-V to ensure smooth integration into existing environment.
- Developed a small application to analyze class dependencies and identify redundancies within jar files. This tool was used extensively to disentangle existing code before handing off for offshore development.
- Set up a system monitoring environment based on XML, XSLT and Subversion. The associated web pages were used by key stakeholders to quickly track down problems and coordinate testing within a highly dispersed development team.

Architectural Planner April 2004 to August 2004
SBB, Bern (Contract)

Key Skills and Technologies
- CORBA, EJB, JMS, Servlets, JDBC, RMI
- Websphere, JBoss, Apache, Lotus Domino, MQSeries, SAP, Oracle
- TCP/IP, HTTP(S), IIOP(S), LDAP(S), JRMP, NRCP, SQLNET, GPRS, WAP, RIP, OSPF, BGP, WebDAV/Delta-V
- NAT, DNS, SMTP, POP3, SNMP
- Load balancing, Tunneling, Routing, Clustering, Proxy/Reverse Proxy
- DMZ, WES, VPN, SSL/TLS, SSH, SCP, WTLS, Radius, MetaDir, RSA SecurID
- Subversion, TortoiseSVN

- Advised project and department leads on the implications of the new DMZ architecture with a special focus on security and networking aspects.
- Assisted projects in determining suitable migration paths. Helped teams solve critical application porting issues while minimizing development overhead.
- Consolidated the new DMZ architecture based on project feedback and evolving requirements. Designed high level architecture blueprints documenting both present and target operating environments.
- Analyzed the application architecture landscape, paying special attention to all services communicating through internet and extranet channels. Devised a set of criteria for determining DMZ relevance and assisted teams in deciding if and how they would be effected.
- Helped to coordinate efforts across many teams and departments, including the architecture, networking and security departments of SBB, the infrastructure provider (TSystems), a number of external specialists and consultants (Nortel and others), as well as large array of software development teams, both internal and external. Helped to secure the timely flow of key data - crucial in such large projects - between all participants.
- Supplied vital impulses, including recognizing the need for a full-time, fully integrated service organization. Helped to define its goals, structure and processes.

Developer/Architect July 2003 to November 2003
UBS, Zürich (Contract)

Key Skills and Technologies
- Java, POI-HSSF, RMI, Log4J, Dynamic Proxy, Reflection
- Struts, Tiles, JSP, Servlets, JSTL, JNDI, JTA/JTS, EJB, HTML, Javascript
- SOAP, Axis, WSDL, XML, XML-RPC
- Websphere, iPlanet, Tomcat, JBoss
- PKI, SSO, HTTPS, SSL
- Eclipse, Ant, JUnit, Toad, CVS

- Designed and implemented a Web Services portal for a world-wide intranet software integration project. The portal was designed using the Apache AXIS framework running on Websphere 4 application server, using HTTPS. Key concerns were in the areas of security, performance and

maintainability. A solution was provided that enables developers without Web Services knowledge to maintain and extend the functionality.
- Migrated reporting engine to application's new business and data model. This involved major redesign of several key areas, including the interface to the RDB (Oracle), the user interface (Struts) and the spreadsheet output module (Jakarta POI).

Developer/Architect February 2003 to April 2003
Credit-Suisse, Zürich (Contract)

Key Skills and Technologies
- Java, JAAS, RMI, Concurrency, Reflection
- EJB, JNDI, LDAP, XML
- Weblogic, Clustering, JUnit

Assisted in the migration of the eCommerce Platform (formerly Youtrade) from Weblogic 5.x to Weblogic 6.x. The focus here was on ensuring that the application security components would still run correctly under Weblogic 6.x. Tasks included re-engineering workarounds that were originally introduced to deal with shortcomings in Weblogic 5.x and also extensive testing in a clustered environment.

Developer/Architect February 2002 to August 2002
Profitline, Dietikon (Ideartis Consulting)

Key Skills and Technologies
- Java, Java Web Start, RMI, JDBC, Log4J, Concurrency
- EJB, JNDI, JavaMail, JTA/JTS, XML
- Silverstream, JBoss, Tomcat, Apache, VMware
- HTTPS, SSL/TLS, Load balancing, Clustering, DMZ
- OOD, UML, Design Patterns, J2EE Patterns, Java Blueprints
- Eclipse, TogetherJ, Karmira Bugseeker, XDoclet, Toad, Ant, JAD, JUnit, CVS

- Analysis and review of key technical infrastructure aspects: class loading in Silverstream, session handling, connection pooling and transaction management.
- Developed a multi-threaded Java client to test Silverstream's load and performance capabilities by simulating both internet and intranet users. Features included client and server side (via server proxy) performance measurements, statistics gathering capabilities and hooks for plugging in arbitrary tests that could written by other developers.
- Reverse engineering of Silverstream using JAD (JAva Decompiler) and use of several advanced debugging techniques, including modifying and recompiling parts of Silverstream and modifying and compiling parts of the JDK (for example to clarify class loading and resource management issues). Found sporadic and extremely hard to locate error in Silverstream's transaction management engine when handling multiple threads from the same client (race condition). Issue raised with Silverstream, who recommended upgrading to V4.0.
- Wrote an XDoclet extension to automatically generate the EJB interfaces and implementation classes from the existing application specific component model.
- Developed a platform for performing zero administration application deployment using Java Web Start.

Developer/Architect January 2001 to January 2002
Credit-Suisse, Zürich (Ideartis Consulting)

Key Skills and Technologies
- Java, JAAS, RSA SecurID, BCEL, RMI, Log4J, Concurrency, Dynamic Proxy, Reflection
- EJB, CORBA, JSP, Servlets, JNDI, LDAP
- XML, XSL, XSLT, XPath, DOM, Xerces, Xalan
- Weblogic, Tomcat, Apache, VMware, HTML
- SSO, DMZ, HTTPS, IIOPS, LDAPS
- Load balancing, Clustering
- OOA/OOD, UML, Design Patterns, Extreme Programming
- TogetherJ, NetBeans, Ant, Karmira Bugseeker, JUnit, Jindent, JAD, CVS

- Proposed an extended application security architecture based on the EJB 1.1 specification to solve Credit-Suisse specific security requirements. Client- and server-side proxies/ interceptors were at the heart of this architecture, allowing the extended security mechanisms to be plugged in transparently. Other features were the ability to plug in arbitrary - even multiple simultaneous - security domains and an XML based permission request/response format.
- Deliverables included a white paper describing the architecture in detail, an implementation of the software for the Weblogic platform with Junit tests and API (javadoc) documentation and extensive Ant scripts providing automatic deployment

in clustered and non-clustered environments.

- The software was tested extensively - in both clustered and non-clustered configurations - for functionality and performance. These tests were conducted on the Intel platform using VMware virtual machines, before deploying and re-testing on the target platform, Solaris.

Developer August 2000 to January 2001
Zürcher Kantonalbank (Ideartis Consulting)

Designed and implemented a solution for integrating Entrust PKI/Smartcards with Websphere application server. Solution consisted of a reverse proxy that enabled tunneling of RMI (EJB calls) through HTTPS to ensure highly secure B2B connectivity for elite customers. Client-side remote object wrappers, in conjunction with the reverse proxy, ensured that this additional infrastructure remained completely transparent for EJB developers.

Key Skills and Technologies

- Java, JCDK, RMI, Concurrency
- EJB, JNDI, LDAPS, MetaDir, HTTP(S), XML
- VPN, SSL/TLS, Tunneling, Reverse Proxy
- Entrust, Smartcards, Biometrics, PKI, SSO, OpenSSL
- Websphere, VMware, Ant, NetBeans, JUnit, Jindent, CVS
- OOA/OOD, UML, Design Patterns

Developer April 2000 to July 2000
AWK Engineering, Zürich (Ideartis Consulting)

Designed and implemented a web front end for a project management system using JSP and Tomcat. This project was delivered to the customer and put in production as a "stateless" VMware virtual machine. In this configuration, state is not written to the virtual hard disk directly, but instead goes into a log file. Should problems arise, the system administrator can simply reboot the virtual machine and the state is precisely restored. Also, since the virtual hard disk is just another file on the host OS, this file can be backed up to protect against worst case scenarios. The result was that the customer was able to view the deliverable as a pure black box, drastically reducing the need for training and coordination.

Key Skills and Technologies

- Java, Concurrency, JDBC
- Servlets, JSP, JNDI, JTA/JTS, HTTP, XML
- Tomcat, Apache, VMware
- ODBC, MS Access
- OOA/OOD, UML, Design Patterns
- NetBeans, Ant, JUnit, Jindent

Developer November 1998 to March 2000
Rentenanstalt (Swisslife), Zürich

- Designed and implemented a reporting component for a Customer Relationship Management (CRM) solution written in C++, using Visual C++ and Microsoft Foundation Classes (MFC).
- Introduced a widget library that extended the MFC by adding Model/View/Controller (MVC) classes and Java-like listeners and events. This library, entitled ExtremeMFC, offered a much greater level of abstraction than Microsoft's own API. It was initially designed to support the development of the CRM reporting component, and was later widely adopted throughout the rest of the application.
- Assisted in the analysis, design and implementation of a prototype for an EJB-centric Customer Relationship Management (CRM) solution.

Key Skills and Technologies

- Java, Swing, Applet, JDBC, RMI, JNI
- EJB, CORBA, JNDI, HTML, CSS
- Oracle, MS Access, ODBC, Apache, VMware
- HTTP(S), IIOP(S), JRMP, RIP, SSL
- ClearCase, CVS
- TogetherJ, Rational Rose, Frontpage
- OOA/OOD, RUP, UML, Design Patterns
- C++, STL, Visual C++, MFC, Win32 API, Rogue Wave

Developer April 1997 to October 1998
Warburg Dillon Read, Zürich (Perot Systems)

Designed and implemented several tools in C++ to assist in data migration and a Windows NT4.0 rollout, including:

- An application to scan the network for workstations and extract the informa-

Key Skills and Technologies

- HTML, CSS, Frontpage, IIS
- ODBC, MS SQL Server
- C++, STL, Visual C++, MFC, Win32 API, Perl
- OOA/OOD, UML, Design Patterns

tion defining each user's private mappings.
- An application to replace and overcome some of the shortcomings of Windows NT's own user manager a replacement for login scripts based on a central SQL database.

Developer February 1996 to March 1997
Consida AG, Zürich

Assisted in the migration of C-System - a contract and project management solution - from a proprietary legacy programming environment to Powerbuilder.

Key Skills and Technologies
- Powerbuilder, Sybase, ODBC

IT-Technician September 1992 to September 1994
Studerus Telecom AG, Nänikon

Responsible for the testing and repair of telecommunications devices.

Junior Programmer November 1990 to September 1991
ORGA Project Management AG, Uster

Designed and implemented modules for a customer information system and a time/ project tracking system in DBase and Clipper.

Key Skills and Technologies
- DBase, Clipper

Education

1987-1991	School for Mathematics and Natural Sciences, Rämibühl, Zürich
1985-1987	Secondary School, Zürich
1983-1985	Primary School, Zürich
1978-1982	Primary School, TN, USA

Other Interests

Photography, Coffee & Wine, Trekking & Camping, Jogging, Bicycling, Philosophy, Yoga

Skills and Technical Experience

Skills are rated on a scale from 1 to 5 as follows:

Expert	5
Advanced understanding of skill area	4
Thorough understanding of skill area	3
Some experience, good working knowledge	2
Limited understanding, little actual experience	1

Core Java

Skill	Level	Months
Java General Knowledge	5	138
Java Generics	5	84
Java Annotations	5	84
Lambda Expressions / Closures	4	12
Java Concurrency	5	120
Another Tool for Language Recognition (ANTLR)	5	24
JavaBeans	5	114
Java Collections	5	138
Java Database Connectivity	4	102
Java Authentication and Authorization Service	4	24
Internationalization Features	3	36
Java Security Features - General Knowledge	3	60
AWT & Swing	3	36

Java Enterprise

Skill	Level	Months
J2EE General Knowledge	4	150
Enterprise JavaBeans	4	60
Java Message Service	3	6
Java Servlets	4	96
Java Persistency API	4	78
Java Transaction API	3	30
Java Transaction Service	3	30
JavaMail	2	12
Java Naming and Directory Interface	5	60
Lightweight Directory Access Protocol	3	24
J2EE Deployment	5	120
Java API for XML Processing	3	6
JavaServer Faces	3	12
JavaServer Pages	3	24
JSP Standard Tag Library	2	6
Spring Framework	2	12

Modeling

Skill	Level	Months
Modeling General Knowledge	5	186
Unified Modeling Language	5	180
Systems Modeling Language	4	36
Meta-Object Facility	4	102
UML Profiling	5	102
Domain Specific Languages	5	126
Object Oriented Analysis/Design	5	192
Design Patterns	5	162
MagicDraw UML	5	84
MagicDraw Plugin Architecture	4	12
MagicDraw Domain Specific Language Features	4	12
Eclipse Modeling Framework	4	6
Sparx Enterprise Architect	3	18

Web Services

Skill	Level	Months
Web Services General Knowledge	4	42
JavaScript Object Notation (JSON)	5	36
Java API for RESTful Web Services (JAX-RS)	3	36
Simple Object Access Protocol	2	6
Web Service Description Language	2	6
XML-RPC	2	6

Middleware

Skill	Level	Months
Apache Web Server	3	54
Tomcat Servlet Engine	3	36
Jetty Servlet Engine	4	48
Oracle Glassfish Application Server	3	42
JBoss	2	12
BEA Weblogic Application Server	2	24
IBM Websphere Application Server	2	12
IBM MQSeries	2	6
VMware	3	48
Oracle VirtualBox	3	48

Database / ORM

Skill	Level	Months
SQL General Knowledge	4	84
JPQL General Knowledge	4	30
Oracle	3	66
DB2	2	6
MS SQL Server	2	24
MS Access	2	6
Sybase	2	18
PostgreSQL	2	6
MySQL	3	6
Apache Derby	4	48
Open Database Connectivity	2	54
EclipseLink	3	6
Hibernate	4	78

XML

Skill	Level	Months
Extensible Markup Language	3	60
XML Schema	2	42
Document Type Definition	2	42
XML Namespaces	2	42
Extensilbe Stylesheet Language	2	24
XSL Transformation	3	24
XPath - XML Selection Language	3	18
Document Object Model	3	24

Web Front-End

Skill	Level	Months
Hypertext Markup Language	3	132
Cascading Style Sheets	3	102
Javascript	2	12

Networking Protocols

Skill	Level	Months
TCP/IP Protocol Suite	4	96
Domain Name System	3	78
Dynamic Host Configuration Protocol	4	78
Network Address Translation	4	54
Simple Network Management Protocol	4	18

Networking Architecture

Skill	Level	Months
Routing	4	54
Bridging	4	48
Tunnelling	3	12
Clustering	3	30
Firewalls	3	48

Load balancing	4	30
Proxy/Reverse Proxy	4	12

Networking Security

Skill	Level	Months
Secure Sockets Layer	3	42
Transport Layer Security	3	18
Virtual Private Network	4	12
Demilitarized Zone	4	30

Security

Skill	Level	Months
Cryptography General Knowledge	3	30
Authentication	4	84
Authorization	4	78
Single Sign On	4	48
Public Key Infrastructure	3	12
Shibboleth	3	6
Pretty Good Privacy	3	48
Biometrics	3	6
RSA SecurID	3	18
Smartcards	2	6

Version Control

Skill	Level	Months
Git	4	12
Github	4	12
Subversion	4	72
Concurrent Versions System	2	54
Rational ClearCase	1	6

Development Tools

Skill	Level	Months
Eclipse	5	96
NetBeans	2	24
Maven	2	6
Ant	5	90
Ivy	3	6
Gradle	3	12
Javadoc	3	60
Java Doclet	3	18
JUnit	5	114

Operating Systems

Skill	Level	Months
Mac OS	5	90
Linux	4	48
Windows	2	132
Solaris	1	60
DOS	1	12

Other Languages

Skill	Level	Months
C / C++	3	36
DBase	1	12
Clipper	1	12
Powerbuilder	1	0
Perl	1	30