

# Contents

<b>1</b>	<b>Introduction.....</b>	<b>6</b>
1.1	Internet .....	6
1.2	History of the Internet .....	14
1.3	Constraints of CGI .....	22
1.4	Performance .....	22
1.5	Statelessness.....	23
1.6	Scalability.....	23
1.7	Functionality .....	24
<b>2</b>	<b>Solutions for CGI Optimization .....</b>	<b>25</b>
2.1	Efficiency in Perl .....	25
2.2	I/O Buffering.....	25
2.3	Reverse DNS Lookups.....	26
2.4	Non-Parsed Headers.....	26
2.5	Division of Labour .....	27
2.6	Client-Side Processing .....	27
2.7	State Persistence Using Cookies .....	29
2.8	Co-Processing .....	29
2.8.1	FastCGI .....	29
2.9	Preprocessing and Caching .....	31
2.9.1	Server Redirection .....	31
2.10	Embedded Interpreters .....	32
2.10.1	mod_perl .....	32
2.11	Goodbye to Performance .....	33
2.12	Conclusion .....	33
<b>3</b>	<b>Client Server Technology.....</b>	<b>34</b>
3.1	Benefits .....	34
<b>4</b>	<b>Evolution of Application Servers.....</b>	<b>36</b>
4.1	Enterprises Shift to the Middle-tier.....	36
4.2	Challenges Posed by Multi-tier, Distributed Applications .....	37
4.3	Developing a Multi-tier, Distributed Application Is Complex .....	37
4.3.1	Deploying the Hundreds of Components that Make Up a Distributed Application Is Challenging .....	38
4.3.2	Managing Thousands of Distributed Components Is Daunting .....	38
4.3.3	An Enterprise Application Server Is the Answer .....	39
4.3.3.1	Web Application Server.....	39
4.3.3.2	Legacy Application Server .....	40
4.3.4	Enterprise Application Server .....	40
4.3.4.1	Purpose and use.....	42
4.3.4.2	Trends and expectations.....	42
<b>5</b>	<b>Distributed computing model .....</b>	<b>44</b>
5.1	Development language.....	44

5.1.1	Platform.....	44
5.1.2	Achieving scalability across one or more systems:.....	44
5.1.3	Services needed for application server environment .....	45
<b>6</b>	<b>Early Bottlenecks .....</b>	<b>46</b>
<b>7</b>	<b>Application Server .....</b>	<b>49</b>
7.1	Advantages of RMI.....	51
7.2	Passing Behavior.....	54
7.3	Object Oriented Code Reuse and Design Patterns.....	55
<b>8</b>	<b>RMI Architecture .....</b>	<b>57</b>
8.1	RMI and the OSI Reference Model .....	58
8.2	Safety and Security .....	60
8.3	Firewalls.....	61
8.4	RMI in an Evolving Enterprise .....	61
8.5	Conclusion on RMI.....	64
<b>9</b>	<b>The best language for server-side applications .....</b>	<b>65</b>
9.1	Characteristics of a Java application server .....	66
<b>10</b>	<b>Multithreading .....</b>	<b>70</b>
10.1	Benefits of multithreading .....	70
10.1.1	Improve application responsiveness.....	70
10.1.2	Use multiprocessors more efficiently.....	70
10.1.3	Improve your program structure .....	70
10.1.4	Use fewer system resources.....	70
10.1.5	Improve performance .....	71
10.2	The Multithreaded Execution Model .....	71
<b>11</b>	<b>Contribution .....</b>	<b>73</b>
<b>12</b>	<b>Appendix.....</b>	<b>75</b>
12.1	Program Listing .....	75
12.1.1	Passing Objects in RMI.....	79
12.1.2	Serializable interface .....	80
12.2	Typical Performance Characteristic.....	102
12.2.1	Emerging Market .....	102
12.2.2	Product Trade-Offs .....	103
12.3	Specification Summary.....	106
12.4	References.....	107

## List of Figures

Figure 1 : Constraints of CGI .....	22
Figure 2 : Data-flow in a stand-alone program .....	34
Figure 3 : Data-flow in a client/server application. ....	34

## List of Tables

Table 1 : List of Application Servers.....	105
Table 2 : Specification.....	107

