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Adaptable system/software architectures

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7 Adaptability is emerging as an important type
8 of non-functional requirement (NFR) for just
9 about any system, including information systems,
10 embedded systems, e-business systems, and the
11 like. Briefly stated, adaptability is the ability of a
12 system to accommodate changes in its environ-
13 ment. Since all systems work in an environment,
14 an adaptable system should adapt to changes in its
15 environment in order to succeed or even to sur-
16 vive. Often times the notion of adaptability seems
17 to be quite broad, with many other closely-related
18 types of NFRs such as flexibility, evolvability,
19 transformability, reusability, and extensibility.
20 This broad nature makes adaptability not only
21 interesting but also critical in practice and chal-
22 lenging as a research topic.

23 Now at what point during the system/software
24 development does one consider adaptability? It
25 has been widely recognized that the earlier during
26 the software development these NFRs are taken
27 into account, the easier and the more cost-effective
28 it becomes for the final system/software to satisfy
29 these NFRs. The first step in the design of a sys-
30 tem/software is the development of the underlying
31 structure of the system/software, namely, the ar-
32 chitecture. But how does one go about developing
33 an adaptable system/software architecture?

34 The answer to this question was the focus of the
35 Workshop on Adaptable System/Software Archi-

tures (WASA) held in Las Vegas on June 25, 36
2003, the second in the series with the previous one 37
held as a session of the International Conference 38
on Software Engineering Research and Practice 39
(SERP), Las Vegas, June 2002. The papers pre- 40
sented at WASA illustrated the problems and so- 41
lutions for developing adaptable software 42
architectures for different domains. In this special 43
issue we have selected some of the more interesting 44
papers among those presented at WASA. The sel- 45
ected papers exemplify the technical hurdles that 46
need to be overcome to engineer adaptability in 47
the respective domains. They also highlight the 48
importance of the adaptability NFR in the various 49
domains. 50

51 The papers for WASA came from six countries
52 in three continents reflecting serious interests from
53 both academia and industry. The first paper enti-
54 tled “Mapping Evolving Business Rules to Soft-
55 ware Design” by Wan M.N. Wan-Kadir and
56 Pericles Loucopoulos, studies the relationship be-
57 tween evolution of business rules and evolution of
58 software. The authors develop a link model that
59 helps establish traceability between business re-
60 quirements and software design. XML DTD is
61 used to specify the metamodel of the UML design.

62 The second paper entitled “Assessing Systems
63 Adaptability to a Product Family” by Mika Ko-
64 rhonen and Tommi Mikkonen, assesses the ex-
65 tension of an architecture for an industrial system
66 into a product family—the problems encountered
67 with this extension are assessed. Questionnaires

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68 and metrics have been used to assess the archi-
69 tecture.

70 The third paper entitled “Measures for Mobile
71 Users: an Architecture” by Alberto Sillitti, Andrea
72 Janes, Giancarlo Succi, and Tullio Vernazza, dis-
73 cusses the architecture of a tool called PROM that
74 helps to automate collection of software metrics
75 such as code length and reusability, as well as
76 software process data such as time spent in each
77 activity, number of changes per class, etc.

78 The fourth paper entitled “A Software System
79 Evolutionary and Adaptive Framework: Applica-
80 tion to Agent Based Systems” by Patricia Pa-
81 derewski-Rodriguez, Juan Jesus Torres-Carbonell,
82 Ma Jose Rodriguez-Fortiz, Nuria Medina-Me-
83 dina, and Fernando Molina-Ortiz, proposes a
84 framework for the evolution of agent-based sys-
85 tems. The paper develops formalization for such
86 systems using operators and detecting invariants.

87 The fifth paper entitled “A Model of Runtime
88 Transformation for Distributed Systems Based on
89 Directed Acyclic Graph Model” by Murakami
90 Masaki, presents a formal model for runtime

program transformation for distributed systems. 91
The model uses linear logic and acyclic graphs to 92
define program transformation mathematically. 93

The sixth paper entitled “Generative and In- 94
cremental Implementation for a Scripting Inter- 95
face” by Vespe Savikko, describes the architecture 96
of a tool that helps provide a flexible scripting 97
support interface to existing systems. A real-life 98
study implementing the architecture is also dis- 99
cussed. 100

We believe that these papers give a glimpse into 101
adaptable problems in different domains and some 102
techniques to develop adaptable architectures in 103
these domains. We hope that the reader is able to 104
get an insight into the important NFR of adapt- 105
ability and its manifestation in different domains. 106
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