Functional-based modeling
White paper
June 2009

Rational. software

UML for the C programming language.

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Contents

Executive summary

Unified Modeling Language (UML) has been highly successful in the modeling of software-intensive systems, including systems-oriented models and realtime
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Object-based designs are even simpler because they don't use the full richness of UML; specifically, they disallow the use of generalization and polymorphism. This results in designs that more directly and obviously map to the C language features but don't take advantage of all the conceptual tools available within UML.

Highlights

The last approach, functional-based modeling, is the focus of this paper. There are many reasons developers may want to avail themselves of the power of UML to represent the different aspects of their systems (e.g., functional, behavioral, atures completely,

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	File diagram	Class diagram	Shows the .cpp and .h files and their relations, including
	Source code diagram	<none>	Shows the generated source code as editable text
Behavior	Message diagram	Sequence diagram	Shows sequences of calls and events sent among a set of files, including passed parameter values
	State diagram	State diagram	Shows the state machine for files and how their included functions and actions are executed as events (whether synchronous or asynchronous) are received
	Flowchart	Activity diagram	Details the flow of control for a function or use case

Table 1: FunctionalC profile diagrams.

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Highlights

Functional development within UML

Developers can program functionally with UML diagrams by using a UML stereotype called a file, which is simply a graphical representation of a source

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Let's take the example of a timer file. This file could have the responsibility to keep track of time. It could have variables such as minutes and seconds, and perhaps functions such as reset and tick. The reset function could initialize the ime by one second. n such as the ables minutes and eset().

ypical C program

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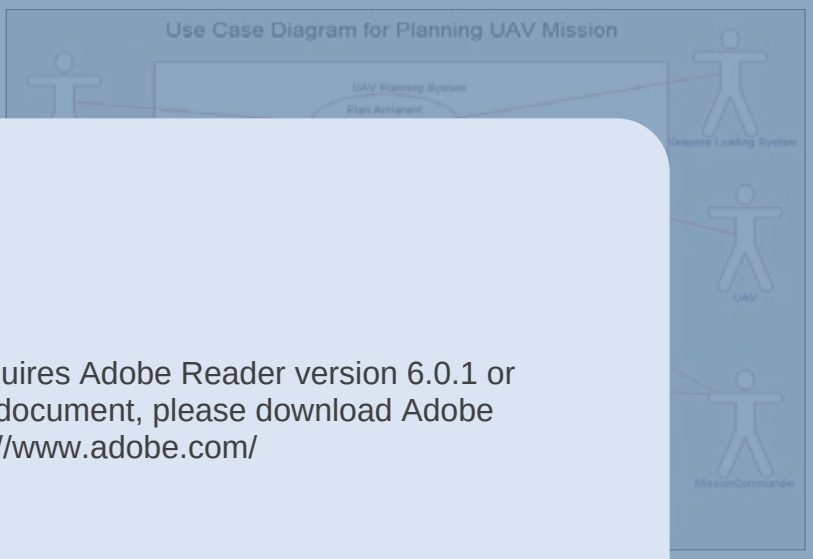
ons contained in her a state n be used in the same model, and files can be converted to objects, if desired. This enables developers who wish to migrate to an OO approach to do it at their own pace and doesn't force an all-or-nothing switch.

Highlights



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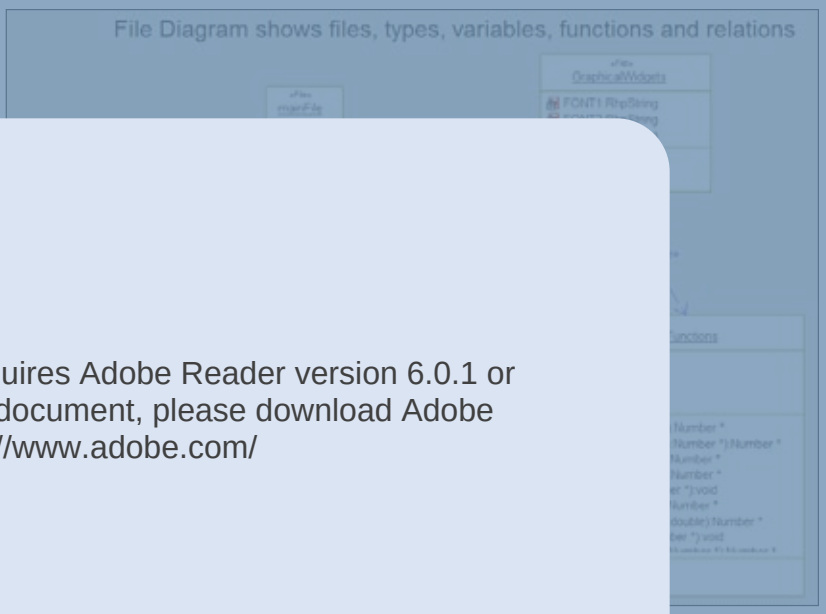

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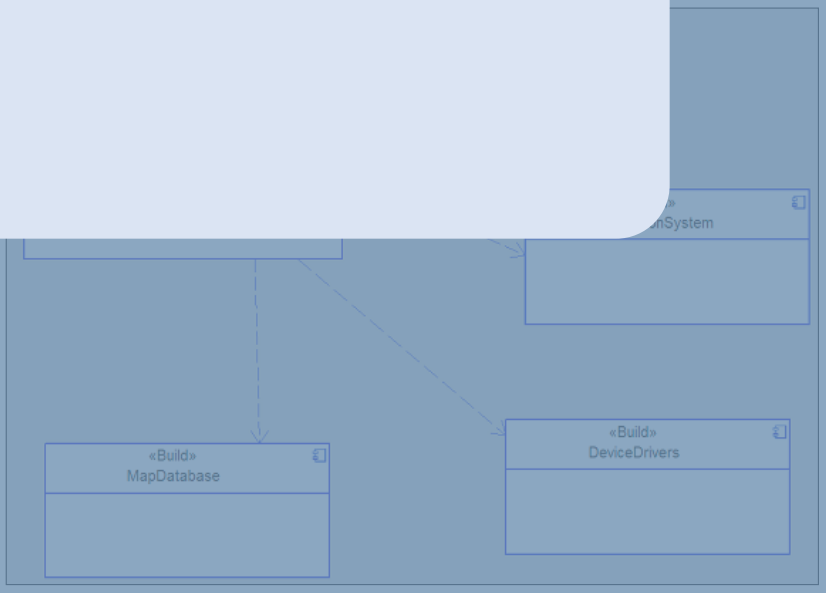

Figure 4: Build diagram.

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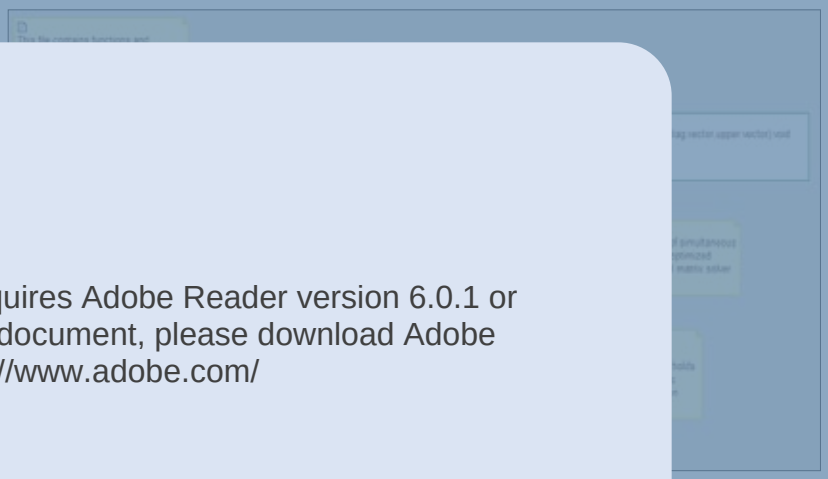
The call graph shows the relations among functions and variables.



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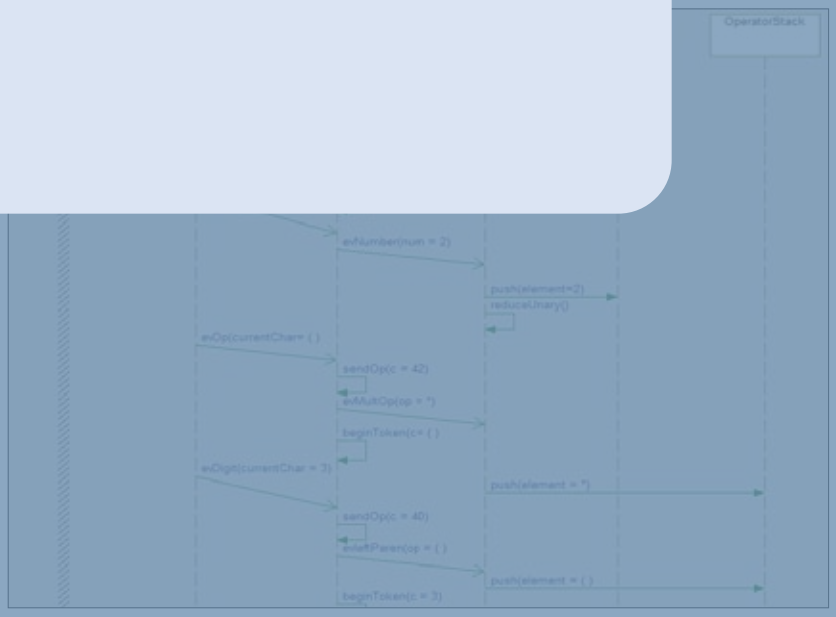

Figure 6: Message diagram.

Highlights

A state diagram represents the set of sets achievable by a file (or use case), the events it receives and the transitions that occur as a result of those event receptions.

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Highlights

A flowchart is used primarily to represent an algorithm or the detailed functional flow of control within a function.

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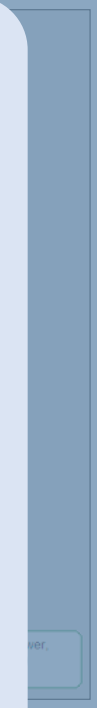

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Validating the design using the model

In a typical design, it is never clear that the model is correct until it has been executed. Technology is available today to perform graphical back-animation …m the model with …en uses this …el concepts. This …l can be used to …e value of the …ile is in, trace the … step through a …roject and allows …and doing design …okkeeping …th the model and …and correct them

… from the model; …nerated …nd embedded …ode can be …rammer writes, …e generated …tions, variables, …eeds to specify the functions and actions on the state charts.

Ensuring that the model and the code are always synchronized

In the traditional use of computer-aided software/system engineering (CASE) tools, programmers spend time creating a model and then generate the co
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For more information

To learn more about UML for the C programming language, contact your IBM representative or IBM Business Partner, or visit:

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