This report summarizes the final progress on an investigation into an engineering-oriented approach for design of distributed-object software. The key results of the research are highlighted, including works published and personnel supported.
MEMORANDUM OF TRANSMITTAL

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REPORT TITLE: Final Progress Report

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SUBMITTED FOR PUBLICATION TO (applicable only if report is manuscript):


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Sincerely,

Dr. Sol M. Shatz
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Chicago, IL  60607-7053

40172-MA
Final Progress Report
Author/PI: S. Shatz

Statement of Problem Studied:
This research investigated an engineering-oriented approach for design of distributed-object software.

Summary of the most important results:

We developed a couple of results related to the use of Petri net-oriented models for design specification. For our State-Based Object Petri Net model (SBOPN), we demonstrated how to create models that support class-level models with instantiation rules to generate object-instance models, and how to synthesize models for objects with restricted behavior from more general ("superclass") models. We also proposed a framework for using the SBOPN notation as a basis for formal modeling of Aspect Oriented systems. We also expanded the SBOPN notation and developed templates of basic object components, defining a set of modules for plug-and-play modeling of a distributed software architecture. Finally, we formulated a scheme for translation of UML diagrams (Statecharts and Collaboration Diagrams) to an object-based Petri net format that can support design simulation and analysis. We are currently developing a prototype tool to demonstrate this capability.

We also developed a new line of research into modeling of agent-oriented software systems. To this end, we defined extensions to the G-net model (an existing object-based Petri net model) and developed a special-purpose agent-based G-net model. We used existing net theory to prove some properties of our agent-based model. In addition, we extended our agent-based model to include inheritance features, creating an agent-oriented model, and used some existing net tool to analyze the model.

Publications:

(a) Journals:


(b) Peer-reviewed Conference Proceedings


(c) Manuscripts submitted, but not yet published


H. Xu and S. M. Shatz, "An Approach to Using Formal Methods in Agent-Oriented Design and Analysis" (to be submitted to the IEEE Transactions on Knowledge and Data Engineering).


Scientific Personnel:

X. Xie completed his PhD degree in 2000.

H. Xu is a continuing PhD student, expected to complete in Fall 2001.

4 other students participated on the project (non-pay) and completed MS degrees.

Report of inventions: None to report