

# GRAPPLE for Measurement Systems

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## Introduction

Microprocessors are presently used in several main segments: personal and office computers, workstations and embedded applications. Although some microprocessors are versatile enough to be used in many segments, the embedded system make a unique set of requirements. This is especially important in complex measuring systems. Data transfer between embedded system and generic control system implemented on a stationary computer collecting measurement results, can be performed in many ways, particularly (depending on one needs) it could be:

- Computer network based on Ethernet or ArcNet;
- Serial port channel RS-485, RS-422, RS-232C or USB,
- A/D or D/A converter if a unit (resisting usually in a lower part of the measuring system hierarchy) is an executing or measuring device;
- Specific computer interface (data bus).

Every embedded system utilised by a superior measuring system should contain the following characteristics:

- ability to implement a control algorithm;
- ability to work in real time;
- ability to render collected information (related to controlled device status) to the superior system;
- ability to receive commands from superior system and to pass them to a proper particular device(s) under control.

This short paper proposes a cycle of object-oriented analysis and software design to control

Devices that utilise embedded real time system.

## The GRAPPLE structure

The Guidelines for Rapid Application Engineering [1] incorporates ideas from different methodologies including Rational Unified Process created by Grady Booch, James Rumbaugh and Ivar Jacobson [2]. The GRAPPLE consists of five main segments: requirements gathering,

analysis, design, development and deployment. Each segment may consist of many actions aimed to create object-oriented work product.

- Requirements gathering (discover business processes, perform domain analysis, identify co-operating systems, discover system requirements)–at this stage we describe the essential of the user's domain and the problem to be solved and present results to client;
- Analysis–at this stage, the results of the analysis stage are used to design the solution of the problem;
- Development (construct code, test code, construct user interface)–with class diagrams, object diagrams, statechart diagrams, artefacts or/and component diagrams, sequence diagrams, activity diagrams (and other diagrams, if necessary) the code for the system is constructed, the product is a code;
- Deployment–the system is deployed on the appropriate hardware and integrated with the co-operating systems.

## Summary

Hierarchical and complex control systems used for supervision, data collection, monitoring and visualisation usually work in real time. The ability of reacting on current events and signals received from the environment is their main feature. A program controlling embedded system utilised in measuring devices is a perfect model of such system. This short paper draws attention to the readers one of the process of object-oriented analysis and design of measurement system. Under presented framework modelling is performed according to UML rules. Software creation process is based on GRAPPLE rules. Within these process most of time is sacrificed to analyse and design while succeeding coding is then easy and efficient, similarly to installation and system deployment. By investing up front in understanding the requirements and modelling the design, we ensure a finished product that is correct, robust, reliable and extensible.

## References

- Schmuller J (2004) Sams Teach Yourself UML in 24 Hours. (3rd edn), Sams Publishing, United States.
- Kruchten P (2003) The Rational Unified Process: An Introduction. (3rd edn), Addison-Wesley Professional, United States.

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