Round Trip Engineering for Legacy Space Data Systems
Based on a Model Driven Architecture Approach

M. Sarkarati 1, E. Gomez 2
ESA/ESOC, Robert Bosch Straße 5, 64293 Darmstadt, Germany

A. Nanni 3
Terma GmbH, Europaplatz 5, 64293 Darmstadt, Germany

D. Tamburri, A. Bianco 4
University of L’Aquila Department of Computer Science, Via Vetoio 1, 67100 L’Aquila (AQ), Italy

Round-Trip-Engineering, RTE, specifies the process of upgrading a legacy software system to a newer version, by extracting first the model of the existing system, modifying the extracted model and generating eventually new software source code from this updated model. To support the process of reuse and migration of legacy software systems, a study has been initiated by the European Space Agency, ESA to investigate the current state of the available RTE technologies. The outcome of this study is a clearly specified process, based on the Model Driven Architecture approach and compliant with the ECSS software engineering standards. Also a tool chain has been identified, which supports the specified RTE process. As part of this study the application of the process and the usage of the tool chain have been demonstrated successfully on an existing component of the ESA SCOS-2000 System.

Nomenclature

ADM = Architecture Driven Modernization
CIM = Computational Independent Model
COTS = Commercial Off-The-Shelf Software
ESA = European Space Agency
ECSS = European Cooperation on Space Standardization
FARC = File Archive Management System
MDA = Model Driven Architecture
OMG = Object Management Group
PIM = Platform Independent Model
QVT = Query View Transformations
PSM = Platform Specific Model
RE = Reverse Engineering
RTE = Round Trip Engineering
SCOS = Spacecraft Control and Operation System

I. Introduction

The European Space Agency, ESA, is currently carrying out an ambitious program under the umbrella name of ESA Ground Operation System, EGOS, which shall standardize the infrastructure used throughout the ESA ground segments with the goal of improving the reliability, cost effectiveness and the interoperability of the ground systems.

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1 Data Systems Engineer, Science Ground Data Systems, ESA/ESOC, Mehran.Sarkarati@esa.int
2 Data Systems Engineer, Ground Infrastructure, ESA/ESOC, Mehran.Sarkarati@esa.int
3 Project Manager, Terma GmbH, Europaplatz 5, 64293 Darmstadt, Germany
4 Computer Scientist, University of L’Aquila Department of Computer Science, Via Vetoio 1, 67100 L’Aquila, Italy

American Institute of Aeronautics and Astronautics

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