

Evolution of OBSW Reference Architectures towards SOA and Component based development

Ward, R; Fowell, S

SciSys

SciSys has been involved in a number of on-board software projects in recent years. These have been built around an in-house product called 'Discus' which provides a set of reusable objects that have been customised for a number of missions such as CryoSat and SWARM. However this is a traditional 'product' and lack of standardisation makes reuse between missions difficult. Despite this tools have been developed to automate the characterisation process (XCOG and XCOG2). From this experience SciSys has been working on a number of in-house, BNSC and ESA funded projects to make such architectures more standardised, reusable and robust. The results have been divided into two generations of process, 'Discus-Classic' which defines the most recently deployed process and 'Discuss-II' which moves towards the next generation process built around Service Oriented Architectures (SOA) and component based design. These are characterised as:

Discus-Classic (Current OBSW architectures)

Spacecraft Domain-Specific Framework:

PUS-based OBSW architecture

UML design

Add-ons:

Data Handling auto generation (XCOG2)

Autonomy (OBCPs, TVCR from MMOPS)

Run-Time Environment:

Cyclic or pre-emptive (RCM) computation model

Ada95/RCM or RTEMS/MISRA C implementation

Add-ons:

Fault tolerance and Distribution (MARC, SOIS)

Discuss-II (Next generation Service-Oriented Architecture for OBSW)

Spacecraft Domain-Specific Framework

Service-oriented OBSW architecture (derived from PUS and SM&C, COrDeT)

HRT-UML, AADL model, auto generation

Bridge to PUS or direct integration into CCSDS SM&C system architecture

Run-Time Environment:

Pre-emptive (RCM) computation model (DisCo, ASSERT DDHRT VM)

Ada95/RCM, RTEMS/MISRA C or RT Java implementation

Embedded RT-CORBA Distribution (DisCo)

Fault tolerance and Distribution (SOIS and DisCo)

This paper will briefly describe the elements of the Process, the benefits of this approach and how it is proposed to migrate to Discuss-II.