

SSR Playback Automation Tool (SPLAT) End-of-Task Report

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Contractor: Aquilent

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Statement of Work

The SSR Playback Automation Tool (SPLAT) effort is aimed at automating and simplifying the Flight Operations task of scheduling Solid State Recorder (SSR) buffer playbacks for the TERRA spacecraft in response to special, non-standard events and difficult planning periods that preclude standard scheduling via the Mission Management System (MMS).

SSR buffer dump scheduling for events such as loss of TDRS contact time due to shuttle missions and spacecraft drag makeup maneuvers is a time consuming, manually intensive activity prone to error and performed by a single member of the Flight Operations Team (FOT). SPLAT encapsulates the knowledge needed to generate these schedules into a simple easy-to-use tool that not only automates the process of generating playback schedules, but also speeds up the generation of the schedules, and allows lower level engineers to perform the work without detailed knowledge of the SSR.

Work Performed

Milestone	Completion Date
System Requirements Specification	Completed April 28, 2002
System Architecture Specification	Completed May 28, 2002
System Design Specification	Completed June 26, 2002
System Design Review Meeting	Held July 9, 2002
SPLAT Beta I Delivery	Completed August 8, 2002
SPLAT Beta II Delivery	Completed August 26, 2002
SPLAT Release 1 Delivery	Completed September 26, 2002

Objectives Met

- Reduced the manually intensive activity of planning SSR buffer playbacks for TERRA spacecraft special events and difficult scheduling periods
- Significantly reduced the amount of time the FOT spends scheduling the SSR playbacks for complex events
- Partially automated the process for lower level FOT engineers to generate SSR playback schedules. The automatic retrieval and processing of the TERRA reports was postponed to FY2003 due to the MMS software developers having higher priority work to perform and complete for FY2002.

Results

The SPLAT tool was developed and delivered on time and within cost. All requirements agreed to were implemented. The senior TERRA engineer is extremely pleased with the tool (see attached email text at end of report) and is using the tool operationally. According to the FOT, the SPLAT tool has reduced time spent on SSR buffer playback scheduling by half or more. This tool has been installed on 3 office PCs, 1 controller PC within the EOC, and the EOC conference room PC. The tool has shown to be an operations asset and reduces the dependence on the senior engineer.

TIME SAVINGS CHART

Terra Engineer Time Spent (Hours)

Event	Frequency	Pre SPLAT Manual	SPLAT V.1 Sept. 2002	SPLAT V.2 April 2003
Inclination Adj. (Sept. & Oct. 2002)	As Needed	4	2	0.5
Drag Makeup Manv.	Monthly	2	0.5	0.1
MODIS Roll Manv.	Monthly	2	0.5	0.1
Plan Changes	Weekly	2	0.5	0.1
Contingencies	When occur	1	0.5	0.1
1 WK GN demo	When requested	8	2	0.5

At the beginning of this task the assigned Technology Readiness Level (TRL) was at level 2. At the completion of this task, the SPLAT tool was assigned a TRL of 8 given the tool has gone through Validation and Verification and is being used operationally.

Summary

The use of Java and the Java Application Shell (JAS) simplified the development effort and provided compatibility with the Terra FOT systems (software and hardware). All of the Terra scheduling modeling parameters were taken from the TERRA MMS system. The FOT provided the algorithms to be used by the SPLAT tool.

The developer, Aquilent, provided a demonstration of SPLAT to Code 583 on August 15, 2002. The TERRA FOT provided a demonstration to Code 428, Paul Ondrus and Ken Dolan, on September 24, 2002. Code 583 provided a presentation on SPLAT to the monthly 580 Technology Sharing meeting on September 25, 2002.

Future work identified and to be funded consists of: providing an interface to the MMS system for automatic retrieval and processing of MMS generated reports, increasing tool robustness and usability for junior engineers, and adding enhancements to support overlapping and end-to-end contacts. Additional follow-on work identified but not funded consists of: provide What-If functionality, adapt tool to AQUA operations, and automate delivery of tool generated SSR schedules to the Terra Online FOT.

SPLAT User/FOT Feedback

Email from September 27, 2002:

I received the beta version on 8/23 and have applied it operationally with great success 5 times already.

I received the final FY2002 version yesterday. It looks great so far.

Bill Muscovich/ TERRA FOT SSR Engineer

Email from September 4, 2002:

Subject: SSR Playback Automation Tool (SPLAT) In Use

All SSR planning for the Drag Makeup Maneuver today (9/4/02) was done using Aquilent SPLAT s/w on my PC (with input files from MMS). The s/w worked great. All Ops. personnel currently working have been briefed on how to use the SPLAT output to manage the SSR today.

I am still testing/proving the s/w, so due to performing manual calculations to double check everything, a time savings has not been actually realized yet.

Based on what I see so far, I expect the following time savings once SPLAT is fully operational:

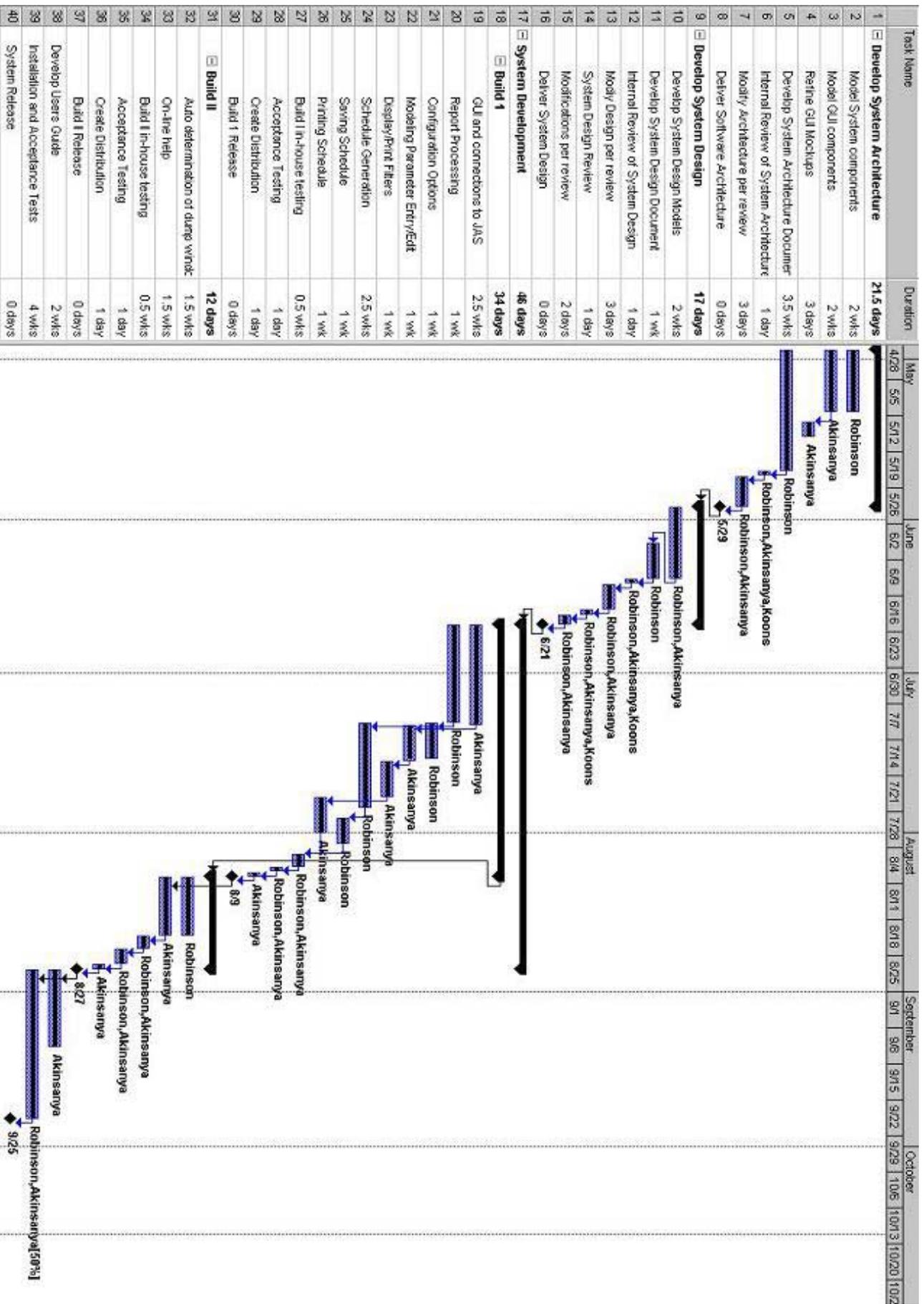
Drag Makeup Maneuver Planning (manual):	120 min. x 1 Senior Eng.
Drag Makeup Maneuver Planning (SPLAT 2002):	25 min. x 1 Senior Eng.
Drag Makeup Maneuver Planning (SPLAT 2003):	10 min. x 1 Junior Eng.

(assuming it is funded)

Email from July 30, 2002:

I spent 6 hrs. at Aquilent today testing the SPLAT (SSR Playback Automation Tool). It performed great. The key task of performing accurate calculations/predictions of SSR Buffer Fullness performed, almost flawlessly, even when I tried to "break" it. The Aquilent team appears to be doing an excellent job. I can't wait to get the current builds complete, so we can get the tool to the EOC and test it operationally.

Bill Muscovich/Terra FOT SSR Engineer



Final Quad Chart



AIST Program Technologies
SSR Playback Automation Tool (SPLAT) (was GOC)

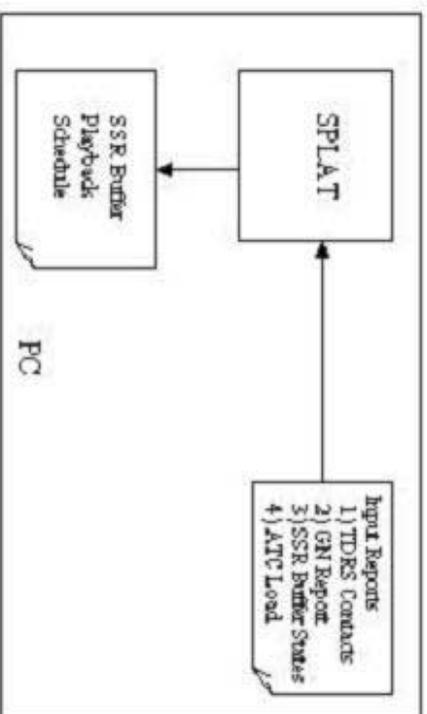


PI: Pat Johnson/GSFC/SS3

Description and Objectives

Scheduling TERRA SSR buffer dumps for special events such as loss of TDRS time due to shuttle launches, inclination adjustments and ground network tests is currently a time consuming and manually intensive process.

The FY02 objectives of the SPLAT project are to develop a tool to partially automate dump scheduling for TERRA buffers, reduce the time needed to schedule buffers dumps for special events, and encapsulate the knowledge necessary to generate special event schedules into a tool allowing junior FOT engineers to generate schedules without intimate knowledge of the spacecraft internals.



Approach

Document the current manual process of scheduling dumps for special events. Identify areas for improvement in the process. increased automation, Develop a JAVA based tool to ingest the necessary reports and , generate, manipulate and view SSR buffer dump schedules for TERRA special events.

Co-T's/Partners

Bill Muscovich Terra Scheduler / Flight Engineer

Schedule and Deliverables

Deliverable	Date
System Requirements Doc / Review	April 2002
System Architecture Doc	June 2002
System Design Doc / Review *	July 2002
Completed SSR Dump Scheduler	September 2002

Application/Mission

The tool developed was targeted at the TERRA mission and buffer dump scheduling issues related to TERRA special events.