Software

SHINE Virtual Machine Model for In-flight Updates of Critical Mission Software

This software is a new target for the Spacecraft Health Inference Engine (SHINE) knowledge base that compiles a knowledge base to a language called Tiny C — an interpreted version of C that can be embedded on flight processors. This new target allows portions of a running SHINE knowledge base to be updated on a "live" system without needing to halt and restart the containing SHINE application. This enhancement will directly provide this capability without the risk of software validation problems and can also enable complete integration of BEAM and SHINE into a single application.

This innovation enables SHINE deployment in domains where autonomy is used during flight-critical applications that require updates. This capability eliminates the need for halting the application and performing potentially serious total system uploads before resuming the application with the loss of system integrity. This software enables additional applications at JPL (microsensors, embedded mission hardware) and increases the marketability of these applications outside of JPL.

This work was done by Mark James, Ryan Mackey, and Raffi Tikidjian of Caltech for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

In accordance with Public Law 96-517, the contractor has elected to retain title to this invention. Inquiries concerning rights for its commercial use should be addressed to:

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Refer to NPO-44547, volume and number of this NASA Tech Briefs issue, and the page number.

Mars Image Collection Mosaic Builder

A computer program assembles images from the Mars Global Surveyor (MGS) Mars Observer Camera Narrow Angle (MOCNA) collection to generate a uniform-high-resolution, georefer-enced, uncontrolled mosaic image of the Martian surface. At the time of reporting the information for this article, the mosaic covered 7 percent of the Martian surface and contained data from more than 50,000 source images acquired under various light conditions at various resolutions.

The program geolocates, reprojects, and blends one source image at a time onto the mosaic. Geolocation and reprojection involve the use of a second-order polynomial based on coordinates of the source-image footprints. Images are stacked in the order of increasing resolution — higher-resolution images on top of lower-resolution images. The stacking order is also partly determined by the order of adding the source images to the mosaic. The mosaic-image data are stored in a custom file format that accommodates regional tiles and supports explicit representation of empty areas, image-data compression, and representation of localized changes.

The program is written as a script in the ImageTCL software of Silicon Graphics, Inc. (SGI), using SGI Image Vision Library with extensions specific to a geographic information system.

This program was written by Lucian Plesea of Caltech and Trent Hare of the United States Geological Survey for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45960.

Providing Internet Access to High-Resolution Mars Images

The OnMars server is a computer program that provides Internet access to high-resolution Mars images, maps, and elevation data, all suitable for use in geographical information system (GIS) software for generating images, maps, and computational models of Mars. The OnMars server is an implementation of the Open Geospatial Consortium (OGC) Web Map Service (WMS) server. Unlike other Mars Internet map servers that provide Martian data using an Earth coordinate system, the OnMars WMS server supports encoding of data in Mars-specific coordinate systems.

The OnMars server offers access to most of the available high-resolution Martian image and elevation data, including an 8-meter-per-pixel uncontrolled mosaic of most of the Mars Global Surveyor (MGS) Mars Observer Camera Narrow Angle (MOCNA) image collection, which is not available elsewhere. This server can generate image and map files in the tagged image file format (TIFF), Joint Photographic Experts Group (JPEG), 8- or 16-bit Portable Network Graphics (PNG), or Keyhole Markup Language (KML) format. Image control is provided by use of the OGC Style Layer Descriptor (SLD) protocol. The OnMars server also implements tiled WMS protocol and super-overlay KML for high-performance client application programs.

This program was written by Lucian Plesea of Caltech and Trent Hare of the United States Geological Survey for NASA's Jet Propulsion Laboratory.

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-45959.

Providing Internet Access to High-Resolution Lunar Images

The OnMoon server is a computer program that provides Internet access to high-resolution Lunar images, maps, and elevation data, all suitable for use in geographical information system (GIS) software for generating images, maps, and computational models of the Moon. The OnMoon server implements the Open Geospatial Consortium (OGC) Web Map Service (WMS) server protocol and supports Moon-specific extensions. Unlike other Internet map servers that provide Lunar data using an Earth coordinate system, the OnMoon server supports encoding of data in Moon-specific coordinate systems.

The OnMoon server offers access to most of the available high-resolution Lunar image and elevation data. This server can generate image and map files in the tagged image file format (TIFF) or the Joint Photographic Experts Group (JPEG), 8- or 16-bit Portable Network Graphics (PNG), or Keyhole Markup Language (KML) format. Image control is provided