HYPERMEDIA AND INTELLIGENT TUTORING APPLICATIONS IN A MISSION OPERATIONS ENVIRONMENT

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Overview

The Automation Technology Section at Goddard Space Flight Center is investigating hypermedia, hypertext, and Intelligent Tutoring System (ITS) applications to support all phases of mission operations. Current NASA/Goddard research is addressing:

- Research into the application of hypermedia and ITS technology to improve system performance and safety in supervisory control - with an emphasis on modeling operator's intentions in the form of goals, plans, tasks, and actions.

- Review of hypermedia and ITS technology as may be applied to the tutoring of command and control languages.

- Development of a hypertext based ITS to train Flight Operations Teams (FOT) the Systems Test and Operations Language (STOL).

This presentation highlights specific hypermedia and ITS application areas, including: computer aided instruction of flight operation teams (STOL ITS) and control center software development tools (CHIMES and STOL Certification Tool).
STOL ITS

The STOL Intelligent Tutoring System (ITS) has the following design objectives:

• STOL ITS will be designed to assist NASA control center personnel in learning Systems Test and Operations Language (STOL).

• The STOL ITS will be designed to provide the Gamma Ray Observatory (GRO) Flight Operations Team (FOT) with introductory and refresher training/tutoring on STOL and its applications to the GRO/FOT.

• Develop a user interface, employing aspects of hypermedia, for an ITS to assist NASA control center personnel in learning Systems Test and Operations Language (STOL).

• Modules may serve as an ITS for other control languages such as the User Interface Language (UIL).
## ITS/Hypermedia Functions

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>FOCUS OF THIS PHASE</th>
<th>LEVEL OF IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating the tutoring session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessing the student's status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presenting the problem</td>
<td>•</td>
<td></td>
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<tr>
<td>Monitoring the student's performance</td>
<td></td>
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<tr>
<td>Assessing the student's goal</td>
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<tr>
<td>Identify the information to be tutored</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Adapting tutor mode to student</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Tutoring the student</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Updating the student model</td>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>
User Interface is a Central Issue in the STOL ITS Development
STOL ITS Interface Issues

Emphasize the user interface:

- ITS development matured to the point of becoming user-centered
- complex, relational information to be presented
- use the user interface prototype to gather user data
- use the prototype to evaluate different tutoring strategies
- use the prototype in the knowledge acquisition phase

The STOL ITS uses a hypertext interface, currently expanding towards a hypermedia environment
STOL User Interface

The STOL ITS user interface is:

- Graphic
- Relational
- Employs animation
- Hypertext presentations
- Tending towards hypermedia
Welcome to the STOL Orientation, Cliff Baker.

Click on the element you want information on or press the "Auto" button for an automatic lesson.
STOL Problem Presentation
Animated Feedback Provided
Animated Feedback (continued)

Click the mouse to continue.
**CLRSTAT**

**Directives**

<table>
<thead>
<tr>
<th>ACCESS</th>
<th>ACQUIRE</th>
<th>ASQMAST</th>
<th>ASK</th>
<th>ATTITUDE</th>
<th>ATTSAVE</th>
<th>CHECK</th>
<th>CLRSTAT</th>
<th>CONVERT</th>
<th>CREDIR</th>
<th>DATE</th>
<th>DEVICE</th>
</tr>
</thead>
</table>

**Semantics**

The CLRSTAT directive is used to clear the MODLAN host statistics kept at the AP. When the CLRSTAT directive is issued, all of the statistics are set to 0, except the total number of sessions open, which is set to the number of active sessions. Normally, the statistics are cleared when the DOCS sends a clear statistics request over the network management session.

**Arguments**

No arguments required for CLRSTAT.

**Syntax**

CLRSTAT

**Examples**

CLRSTAT

[Links to related sections: Quit, Transfer, Help, Return to Lesson]
STOL Certification Tool

The STOL Certification Tool was developed to:

- collect error data on STOL users (commands, aliases, arguments, syntax)
- provide a basis for developing and validating STOL ITS student models
- provide a tool for certification of STOL users after and during training (including STOL ITS training)
- develop algorithms/rules for student assessments

The certification tool has a simple interface and architecture. . .
You need to change only the yellow high limit for "CTRAT" to 70. What one-liner directive would you use to make that change?

Answer:
STOL CERTIFICATION AID

Question 4 of 61:
You need to change only the yellow high limit for "CTRAT" to 70. What one-liner directive would you use to make that change?

Answer:
LIMITS CHG CTRAT,,70.0

After which the tool determines whether the response is correct, logs the data, and poses a subsequent problem.
The Student May Also Access a Detailed STOL Glossary

<table>
<thead>
<tr>
<th>Directives</th>
<th>Semantics</th>
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</thead>
<tbody>
<tr>
<td>ACCESS</td>
<td>DIRECTIVE KEYWORD: CFGMON</td>
</tr>
<tr>
<td>ACQUIRE</td>
<td>ALIAS: CFGM</td>
</tr>
<tr>
<td>ASGMAST</td>
<td>ACCESS: MC, CC, FC</td>
</tr>
<tr>
<td>ASK</td>
<td>INPUT MODE: ONE LINER ONLY</td>
</tr>
<tr>
<td>ATTITUDE</td>
<td>SUBSYSTEM: TELEMETRYSTANDARD: YES</td>
</tr>
<tr>
<td>ATTSAVE</td>
<td></td>
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<tr>
<td>BASELINE</td>
<td></td>
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<tr>
<td>CFODEF</td>
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<tr>
<td>CFGMON</td>
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<td>CHART</td>
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</table>

<table>
<thead>
<tr>
<th>Arguments</th>
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<tbody>
<tr>
<td>/ANALOG</td>
<td></td>
</tr>
<tr>
<td>/BACKGROUND</td>
<td></td>
</tr>
<tr>
<td>/BASE</td>
<td></td>
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<tr>
<td>/BILEVEL</td>
<td></td>
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<tr>
<td>/COLUMNF</td>
<td></td>
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<tr>
<td>/COMMAND</td>
<td></td>
</tr>
<tr>
<td>/CRT</td>
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</table>

**Remarks**

None

**CFGMON**

Current Search Term: conversionF

GENERAL DESCRIPTION: The CFGMON directive is used to activate the configuration monitor software, which performs a one shot comparison of telemetry parameter values to predefined comparison constants. When a comparison fails, an event message is generated. The mnemonics to be compared, the comparison functions, the comparison constants, and associated event message information must be read into memory before run-time.
Computer-Human Interaction Models (CHIMES)

CHIMES is a prototype expert system under development which evaluates/analyzes user-computer interface designs.

CHIMES:
- accepts interface descriptions (tasks, operations)
- accepts interface designs
- initiates interface design evaluations
- summarizes interface design deficiencies
- provides recommendations for modifying/improving interfaces

CHIMES is directed at detailed interface design evaluation, addressing concerns such as:
- screen density
- visual demand
- readability
- target identification
- object manipulation