

Commentary on Acting on information: A planning language for manipulating data

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Introduction

This commentary discusses the paper: Acting on information: A planning language for manipulating data. The planning language is an action description language used to manipulate information, such as images from a spacecraft, and the paper describes how it works. Examples are given using mathematical expressions. The author helped clarify some of the symbols and how they are used or referred to.

Observations

My synopsis of this paper is the ADLIM action description language is used by the planning tool IMAGEbot to manipulate spacecraft information, though the type of data or information probably does not matter, and how ADLIM can convey data descriptions along with the manipulation. The planning tool IMAGEbot is briefly discussed as to its role in automating the information manipulation and the storage of vital meta-information that corresponds with the manipulation output. But the main focus of the paper details how the ADLIM language works in relation to similar products and keys on problem areas that arise when planning for information manipulation. One such problem area is how to emulate the tar (copy) function. The paper provides comparisons to other similar language products that do not handle this function well.

To demonstrate the problem areas, the author steps the reader through examples showing how ADLIM represents and reasons with actions. The examples used are very practical especially dealing with copy actions like tar to show how the action language uses frame effects, action goals, procedural constraints, and temporal projection to sense and manipulate data robustly and generally. The paper describes each of these properties culminating with the conclusion.

What really caught my attention was in the Introduction section describing how scripts used to manipulate data do not convey information about the data such as its inter-

relationship among various pieces of data, its meta-information, and the tracking of the data. If ADLIM can truly convey this type of information along with the manipulation action it could be a very useful language tool indeed.

Comparison to EOS

With ADLIM the action language uses its various properties to include information about the data and the tracking of the data. With EOS, the science data for the Terra spacecraft depends on data type descriptor files called metadata that identifies and categorizes each specific data product used throughout the science data processing. The metadata file provides file origin, content description and layout, quality, condition, and how to decode, interpret, and process the data. To process any EOS science data type, the user must obtain the corresponding metadata file in order to know how to deal with the data. The paper indicates ADLIM can possibly provide similar data descriptions with the action language.

Data manipulation within EOS is primarily by software with scripts to automate the processing and to control where the data goes after each step. Any errors or changes to any data format or manipulation process may require a software change. This makes the EOS system very rigid when dealing with permanent changes, emergency changes, and special requests. The use of the ADLIM action language instead of software and scripts could alleviate this restriction.

One common area to both EOS and ADLIM is the use of relational databases. The author explained that relational databases are quite easy to model in a language like ADLIM since it is at heart a relational language; i.e., functions can be easily mapped to relations. Plus, a database is essential for storing data and a relational database provides a means to retain with data its inter-relationships with other data.

Conclusion

Of course, switching to ADLIM for existing spacecraft systems would be costly and time consuming. But the author states that the versatility and structure of ADLIM and the planner tool IMAGEbot would allow it to be integrated into existing 'legacy' systems without requiring changes to the systems because ADLIM can model the user interfaces or APIs of those systems. Future spacecraft systems in the pre-design phase have the option of selecting the best method for managing information and hopefully IMAGEbot and ADLIM will be among the selections.