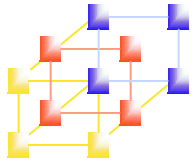


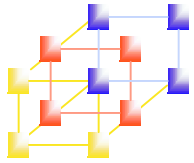
Chapter 3 Loaders and Linkers

-- Machine-Independent Loader Feature



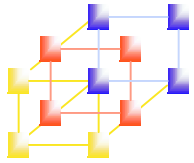
Automatic Library Search

- Automatic library search for handling external references
 - Allows a programmer to use *standard subroutines* which are automatically retrieved from a library as they are needed during linking
- Solution
 - A flag for each symbol in ESTAB (defined/undefined)
 - When add a symbol on R record to ESTAB, set it as undefined
 - If a symbol on D record is found, set is as defined
 - At the end of Pass 1, search the library for undefined symbol
 - If all libraries are searched and some undefined symbol still remains, output error a message



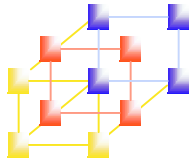
Discussions of Automatic Library Search

- The presented linking loader allows the programmer to override the standard subroutines by supplying his own routines.
- Directory
 - The loader searches for the subroutines by scanning the Define records for all of the object programs. (*inefficient*)
 - It can be more efficient by searching a directory that gives the name and address of each routine.
- The same techniques applies equally well to the resolution of external references to data items.



Loader Options

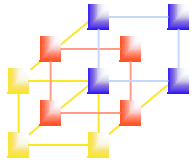
- Users can specify options that modify the standard processing of the loader.
- Many loaders have a special command language that is used to specify options
 1. Written in a separate input file
 2. Embedded in the primary input stream between object programs
 3. Included in source program
 4. Specified in job control language



Loader Options

-- Command language

- Selection of alternative sources of input
 - INCLUDE program-name(library-name)
 - Direct the loader to read the designated object program from a library
- Deletion of external symbols
 - DELETE csect-name
 - Instruct the loader to delete the named control sections from the set of programs being loaded
- Change the external symbols
 - CHANGE name1, name2
 - Cause the external symbol name1 to be changed to name2 wherever it appears in the program

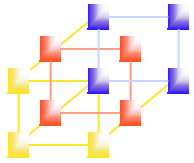


Loader Options

-- Command language (Cond.)

- Automatic inclusion of library routines
 - **LIBRARY MYLIB**
 - Specify alternative libraries to be searched
 - User-specified libraries are normally searched before the standard system libraries.
 - **NOCALL name**
 - Specify the external reference name are to remain unresolved.
 - If it is know that some external reference is not to be performed in an execution

NOCALL STDDEV, PLOT, CORREL



Example of Using Loader Options

- Consider the example in Fig. 2.17. If we would like to evaluate the use of READ and WRITE instead of RDREC and WRREC, for a temporary measure, we use the following loader commands

```
INCLUDE          READ ( UTLIB )
INCLUDE          WRITE ( UTILB )
DELETE          RDREC , WRREC
CHANGE          RDREC , READ
CHANGE          WRREC , WRITE
```