Burroughs' *B Series* Systems

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The Objectives

- The basic objective in designing the system was to define a complete system, both hardware and software together, to enable programs written in high level languages to be compiled and run efficiently.

Main Features

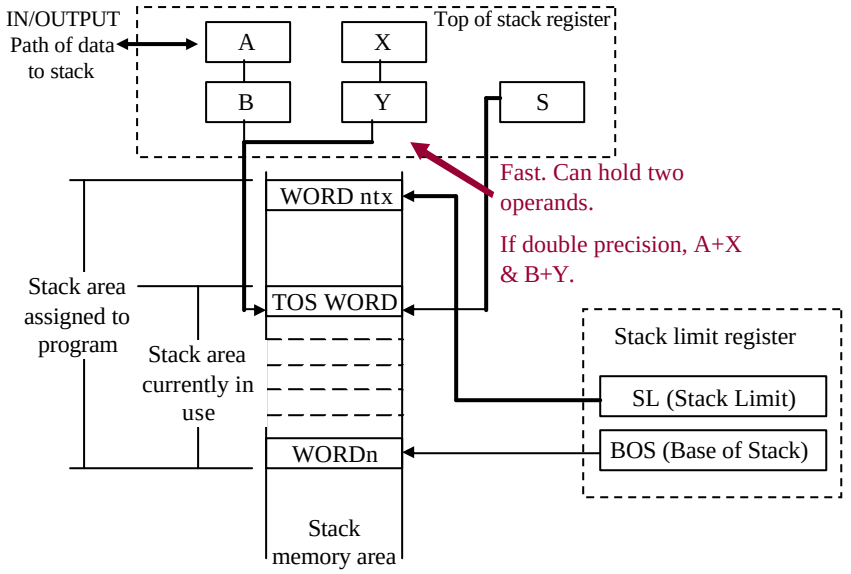
- Important features:
  - Dynamic storage allocation
  - Reentrant programming
  - Recursive procedure facilities
  - A tree structured stack organization
  - Memory protection
  - An efficient interrupt system

Contents

B6500/B7500 Processor

- Basic machine instruction: operator syllable
  - 8 bits to a maximum of 96 bits
- Hardware implemented stack
- Data word
  - 51 bits (3 bits tag + 48 bits data)
  - Tag: data / operator, memory protection

The Stack



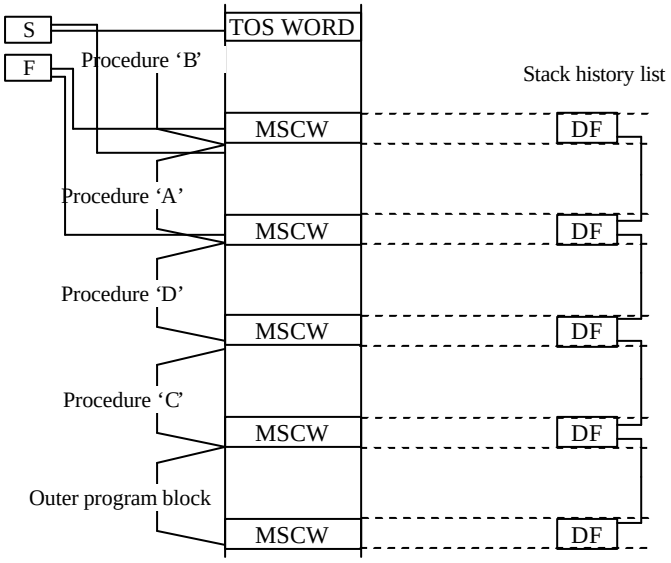
Data Addressing

- Three mechanisms:
  - Data Descriptor *(DD)*/ Segment Descriptor (SD),
    - Addresses which are located outside of the job's stack area.
    - Absolute machine address.
  - Indirect Reference Word (IRW),
    - Relative address
    - Address within the immediate environment of the job's stack
  - Stuffed Indirect Reference Word (IRWS).
    - Relative address
    - Beyond the immediate environment of the current procedure

Non-Local Addressing

- Facility for storing the dynamic history of a program under execution
  - Stack history list
  - Addressing environment list
- Mark Stack Control Words (MSCW)

Non-Local Addressing

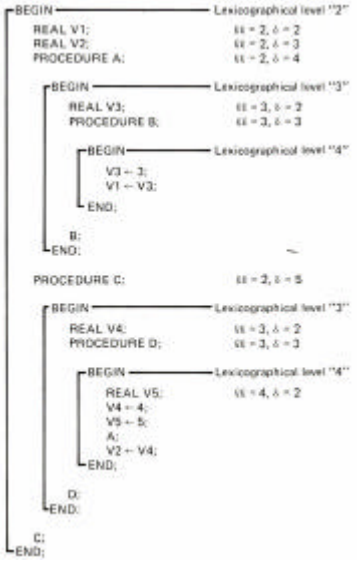



```
The program{
    A{
        B{}
        B;
    }
    C{
        real v4;
        D{
            A;
        }
        D;
    }
    C;
}
```

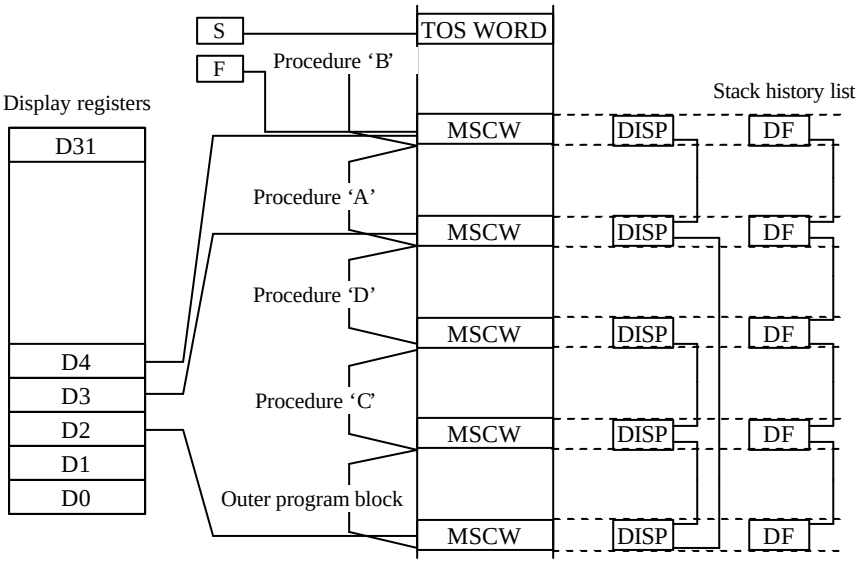
- Procedures are entering ...
- Procedure B exits.
- Non-Local Addressing Problem

Non-Local Addressing cont.

- Address Couple:
  - The lexicographical level
  - The index

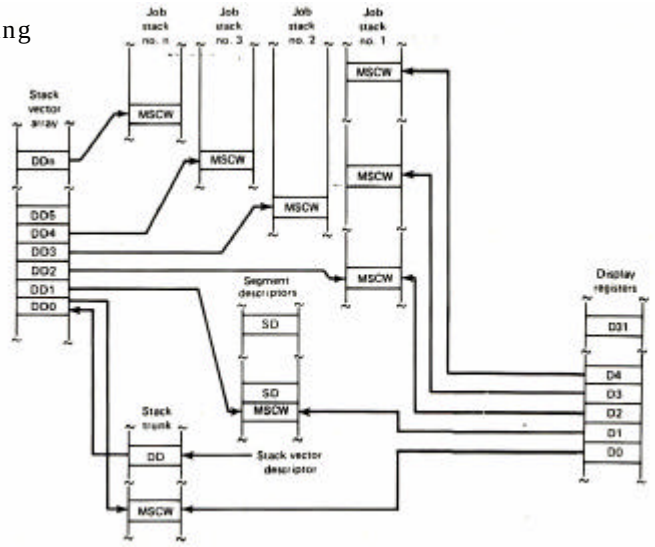


Non-Local Addressing cont.



Multiple Stacks and Re-Entrant Code

- Code sharing



The Operating System

- The operation of the system was to be directed by a Master Control Program (MCP)
- Supports multiprogramming
- 40 interrupt conditions (including timing interrupt)

Summary

- Hardware:
  - Multiple Stacks
- Programming:
  - Be done in ALGOL and COBOL
- Main features:
  - Dynamic storage allocation
  - Reentrant programming
  - Recursive procedure facilities
  - A tree structured stack organization
  - Memory protection
  - An efficient interrupt system

References

1. "Burroughs' B6500/B7500 Stack Mechanism", E. A. Hauck and B. A. Dent, Chapter 16 of *Computer Structures: Principles and Examples*, McGraw-Hill, 1982
2. "Operating System For The B 5000", C. Oliphint, 1964
3. "Studies In Operating Systems", R. M. McKeag and R. Wilson, Academic Press, 1976

Thank you!

Questions?