

The evolution of Database

- File System
 - Sequential File
 - Index Sequential File
- Access
 - Index Sequential Access Method (ISAM)
 - Virtual Storage Access Method (VSAM) - IBM



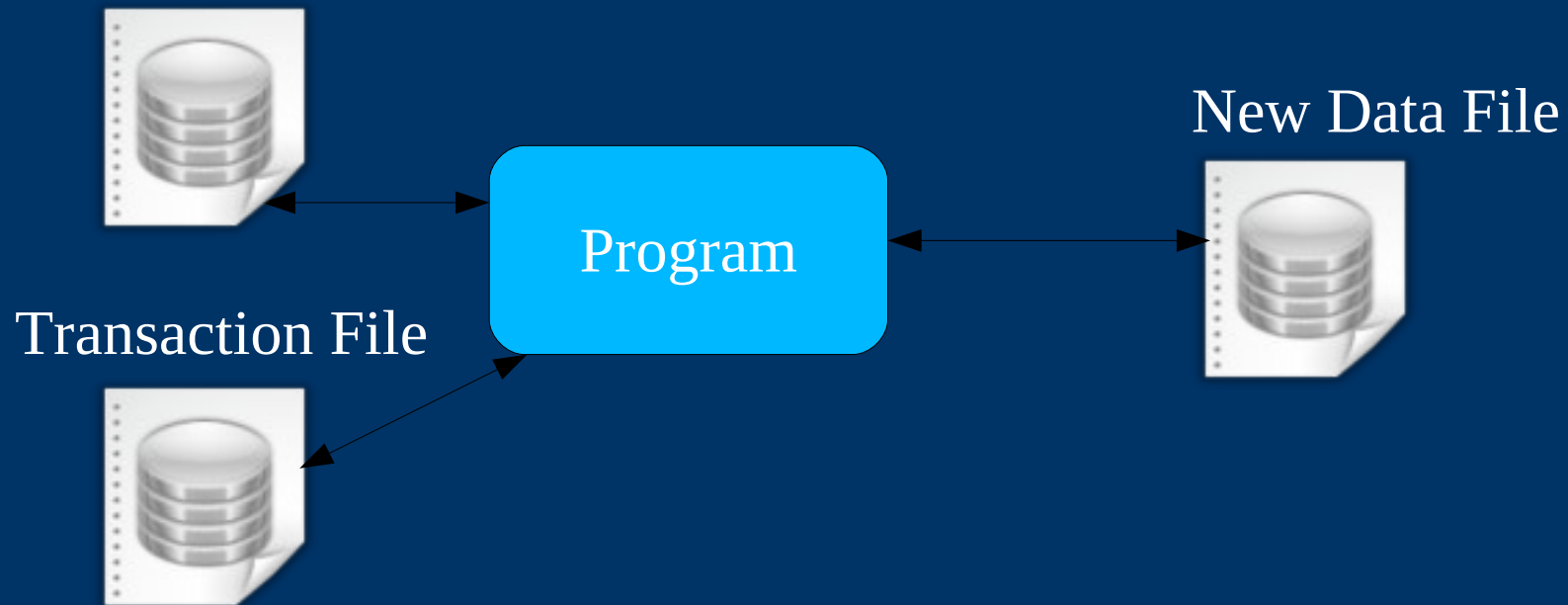
Cobol Code

```
ZBNKPRT1.CBL
ZBNKPRT1.CBL
.....*A.1.B.....2.....3.....4.....5.....6.....7..I.....8
001600 IDENTIFICATION DIVISION.
001700 PROGRAM-ID.
001800     ZBNKPRT1.
001900 DATE-WRITTEN.
002000     September 2002.
002100 DATE-COMPILED.
002200     Today.
002300
002400 ENVIRONMENT DIVISION.
002500 INPUT-OUTPUT SECTION.
002600 FILE-CONTROL.
002700     SELECT EXTRACT-FILE
002800         ASSIGN      TO EXTRACT
002900         ORGANIZATION IS SEQUENTIAL
003000         ACCESS MODE IS SEQUENTIAL
003100         FILE STATUS IS WS-EXTRACT-STATUS.
003200     SELECT PRINTOUT-FILE
003300         ASSIGN      TO PRINTOUT
003400         ORGANIZATION IS SEQUENTIAL
003500         ACCESS MODE IS SEQUENTIAL
003600         FILE STATUS IS WS-PRINTOUT-STATUS.
003700
003800 DATA DIVISION.
003900 FILE SECTION.
004000
004100 FD EXTRACT-FILE
004200     RECORDING MODE IS V
```

Cobol Code of a File Structure

```
01 DFHCOMMAREA.
  02 CUSTOMER.
    03 customerNumber      PIC X(10) .
*  YYYY/MM/DD
    03 customerSince      PIC X(10) .
    03 firstName          PIC A(20) .
    03 lastName           PIC A(20) .
    03 CUSTOMERADDRESS.
      04 streetAddress     PIC X(50) .
      04 city              PIC A(20) .
      04 state             PIC A(20) .
      04 country           PIC A(20) .
      04 zipCode           PIC X(20) .
    03 phoneNumber        PIC X(15) .
    03 sin                 PIC X(20) .
    03 cashBalance        PIC S9(9)V99 .
    03 maximumTransactionAmount
                          PIC S9(9)V99 .
    03 returnCode         PIC 9(5) .
    03 numberOfStockSymbols PIC 9 .
    03 quantityOfShares OCCURS 0 to 5 TIMES
    DEPENDING ON numberOfStockSymbols OF CUSTOMER PIC 9(5) .
    03 stockSymbols OCCURS 0 to 5 TIMES
    DEPENDING ON numberOfStockSymbols OF CUSTOMER PIC X(5) .
  02 OLDCUSTOMER.
    03 customerNumber      PIC X(10) .
```

How it works?

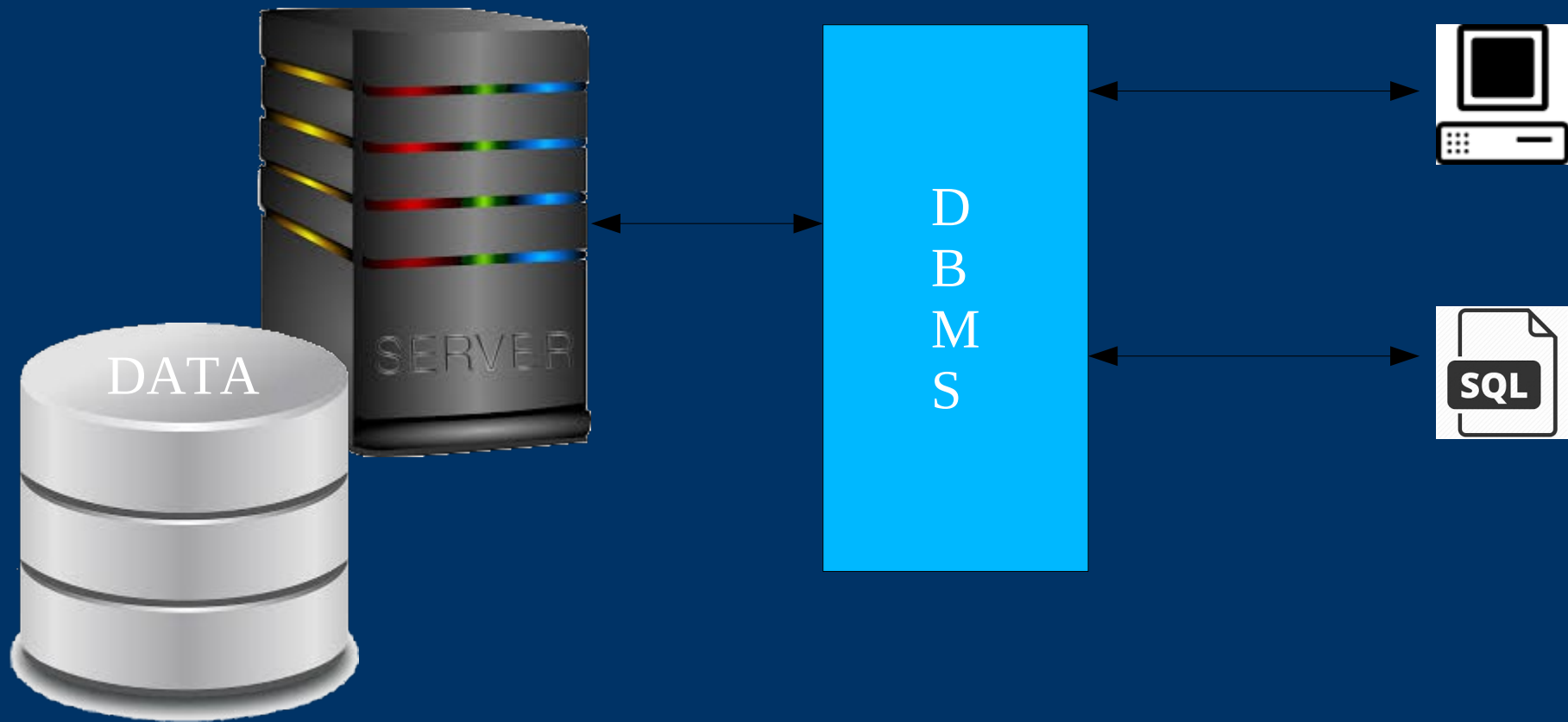


Problems?

- Data Redundancy
- Multi-user Access
- Security of Access
- Real-Time Transaction vs Batch Processing
- Data-Program Dependence



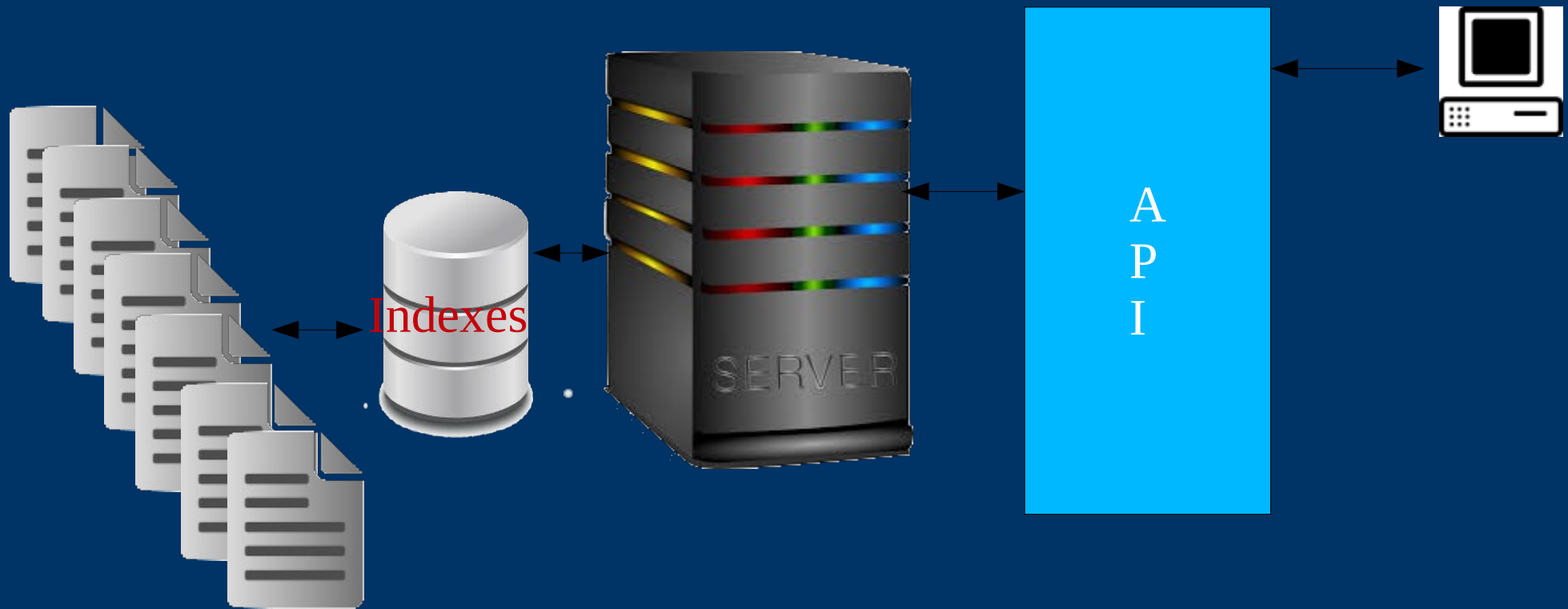
Database Management System (DBMS)



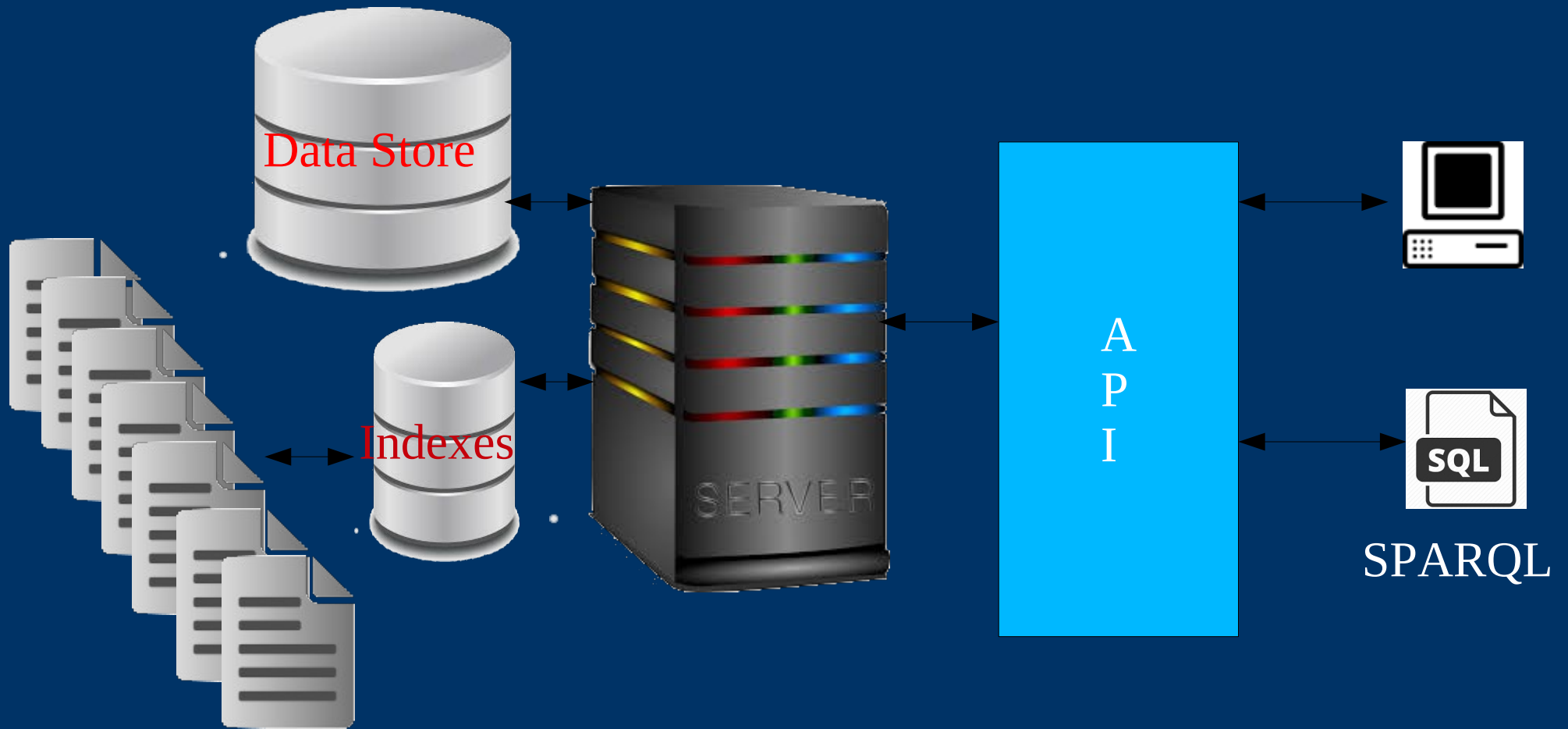
Benefits

- Access Management
 - Multi-User Access Control
 - Security Control
 - Real-Time Transaction Processing
 - Program-Data Independence
-
-

There comes unstructured Data



And also semi-structured Data



Multimedia?

