ADVANCED DATABASES
CIS 6930
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GROUP - 1
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ADABAS
CONTENTS

• FEATURES
  • DATA MODEL
  • DATA STRUCTURES
  • APPLICATION DEVELOPMENT
  • WHY ADABAS?
FEATURES

- Adaptable Database System
- Fast and Reliable transactions
- Scalable
- Cross platform availability
- Flexible data integration
- Low Administration
- Disaster recovery
- High-performance
FEATURES

• High availability
• Compliance
• SQL access
• Space Storage Optimization
• Fault Tolerance
• Multithreaded
• Interoperable
• Portability
• Continuous & cost-efficient operations
• Replication
FEATURES

• Robust security
  – Data Encryption
    • Utilizes pre-specified key to encode ADABAS data storage
    • Encryption is by file
    • Cipher code for data access.
  – Access/update level
    • ADABAS password
    • Threshold protection levels
    • Permission levels are attached to a password
  – Value level
    • Defined for one more fields on a file
    • Different settings for access vs. update
    • Comprise multiple values
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  • POPULAR APPLICATIONS
DATA MODEL

• ADABAS Database
  – Database Identifier [1-255]
  – Database Name [1-16]
  – ADABAS files[1-255]
    • Multiple records in a file
      – Multiple fields in a record
• Limited database size
DATA MODEL

• ADABAS Files
  – Collection of logically related data.
  – Data fields
  – Logical records

<table>
<thead>
<tr>
<th>CU</th>
<th>CI</th>
<th>ST</th>
<th>CO</th>
</tr>
</thead>
<tbody>
<tr>
<td>18568768</td>
<td>San Jose</td>
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<td>28098783</td>
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<tr>
<td>67867868</td>
<td>Orlando</td>
<td>FL</td>
<td>USA</td>
</tr>
</tbody>
</table>
DATA MODEL

• ADABAS descriptors
  – Subdescriptor Eg. ZIPLAST2
  – Superdescriptor Eg. STATE-ZIPLAST2
  – Phonetic Descriptor Eg. Family name
• ADABAS data field
  – Elementary field
  – Multiple-value field
  – Group field
  – Subfield
  – Superfield
DATA MODEL

• Data types
  – Character, binary
  – Decimal numbers
  – Fixed point, floating point
  – Large objects (Multi-media)

• Fields can have multiple values
• Related data is kept closer
DATA MODEL

• Linking different files via common data fields
  – No pointers between records
    • Very similar to relational model
• Read and Update occur on individual records
  – Not sets of records
• How does ADABAS exactly maintain the data?

<table>
<thead>
<tr>
<th>Adabas</th>
<th>Relational</th>
</tr>
</thead>
<tbody>
<tr>
<td>File</td>
<td>Table</td>
</tr>
<tr>
<td>Record</td>
<td>Row</td>
</tr>
<tr>
<td>Field</td>
<td>Column</td>
</tr>
<tr>
<td>Descriptor</td>
<td>Index</td>
</tr>
<tr>
<td>End Transaction</td>
<td>Commit</td>
</tr>
<tr>
<td>Backout Transaction</td>
<td>Rollback</td>
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</table>
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DATA STRUCTURES

• Container files
• Data Storage (DATA)
  – Compressed form of the data
• Associator (ASSO)
  – File Directory
  – Field Definition
  – Indexes
    • Descriptor values to ISNs
  – Address convertor
    • ISNs to DS blocks
• WORK
  – Work file for temporary use
DATA STRUCTURES

• Data Compression
  – Field data typically stored in compressed form
    • Character: No trailing blanks
    • Numeric: No leading zeros
• Compact storage, Efficient access
• Buffer Pool Manager
  – Caching database pages
  – Buffer Replacement Handling
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APPLICATION DEVELOPMENT

Query Languages used for ADABAS

- Natural
- Native SQL
MIGRATION ENVIRONMENTS

- ADABAS Bridge for DL/I
  - DL/I or IMS/DB databases to ADABAS
- ADABAS Bridge for VSAM for OS/390, VSE/ESA
  - Bridge for VSAM under OS/390 or z/OS
  - Bridge for VSAM under VSE/ESA.
MIGRATION ENVIRONMENTS

• ADABAS SQL gateway
• ADABAS Text retrieval
  – Byte-swapping issue
  – Migrating data to UNIX or windows platform
APPLICATION DEVELOPMENT

• Native SQL Gateway
  – Native SQL embedded in C, COBOL

```sql
EXEC SQL
    CREATE TABLESPACE FOR TABLE contract
    (DATABASE=yacht_db,
     FILE=4,
     FILENAME="CONTRACT",
     ASSOPFAC=5,
     DATAPFAC=5,
     DSIZE=10BLOCK,
     NISIZE=10BLOCK,
     UISIZE=10BLOCK,
     MAXISN=300,
     REUSE=(ISN,DS)
    );
END-EXEC
```
APPLICATION DEVELOPMENT

- SOA gateway

Adabas
APPLICATION DEVELOPMENT

• CONNX SQL Gateway
ADABAS CLIENT FOR JAVA API

- ADABAS client for java API
  - ADABAS Client Java Session
  - Transactions
  - Authentication Types
- ADABAS Data Designer
  - Creating maps
  - Creating map dialog
  - Browsing ADABAS data with maps
- ADABAS REST Interface
  - ADABAS REST Server Configuration
  - ADABAS REST server API
ADABAS CLIENT FOR JAVA API

- ADALNK libraries to send ADABAS calls to a local ADABAS database

```java
/* simple Adabas Database target definition (dbid) */
AdabasTarget target = new AdabasTarget(dbid);
target.open();

/* Create read request using the database target file number */
ReadRequest request = new ReadRequest(target, ADA_FILENR);

/* Set list of Adabas short name fields for read request */
request.queryFields(ADA_DATA_FIELDS);
```

- Entire Net-Work used to access remote ADABAS database

```java
AdabasTarget(int dbid, java.lang.String url)
Adabas Target definition with an Entire Net-Work remote URL reference.
```
ADABAS REST INTERFACE

- ADABAS REST Interface

![ADABAS Client for Java - REST Interface Example](image-url)

- JSON queries: Employee list request
  - Offset: 0
  - Nr. of Entries: 20
  - Search in AC: -, startWith: -
  - Offset:


- Result:

<table>
<thead>
<tr>
<th>ISN</th>
<th>AB</th>
<th>AQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AC-SIMONE</td>
<td>AS</td>
</tr>
<tr>
<td></td>
<td>AE-ADAM</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>AC-HUMBERTO</td>
<td>AS</td>
</tr>
<tr>
<td></td>
<td>AE-MORENO</td>
<td>998</td>
</tr>
</tbody>
</table>
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WHY IS (WAS) ADABAS SO POPULAR?
WHO USES(USED) ADABAS?

• FBI
• State Governments
  – Colorado
  – Idaho
• UPS
• Banks
  – Chase
• Insurance Companies
  – American Community Mutual Insurance Company
• Non-profit Insurance Company
• >$1.2 Billions in assets
• With just 75 staff members

• Results
  – Mobile services to 120,000 users
  – Cost Reduction
CA – DEPARTMENT OF TECHNOLOGY

• Highest State IT budget
• bulk processing of census data, consumer statistics, tax collection

• Serves ~40 Million Citizens and processes billions of transactions each week.
• US based Warehouse distribution application
• For Order Entry to Packing and Shipping

• Results:
  – Scalable Database
  – Incredible response times
  – Securely processes 261M commands per day
• Non-profit Environmental Conservation Company from Canada
• Using NaturalONE, auto generated 85% of the HTML code with models, wire framing etc.,

• Results:
  – Auto code generation
  – Plugin Integration
  – Reduced bounce backs.
WHY ADABAS FAILED TO COMPETE?

- NF² – non First Normal Form

- Example:

<table>
<thead>
<tr>
<th>client_id</th>
<th>account_numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3256</td>
<td>54165452</td>
</tr>
<tr>
<td>2345</td>
<td>95184753, 68537142, 85693125</td>
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<td>9514</td>
<td>26159483, 85632914</td>
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<td>8524</td>
<td>62561981</td>
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<td>3698</td>
<td>56321479, 864126208, 84095632</td>
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<tr>
<td>7532</td>
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</table>
SOLUTION (SEMI)

- ADABAS D – a relational database management system
- Running on Parallel on both the Hierarchical and Relational Databases
- But:
  - Maintenance Costs
  - Personnel and Training Costs
  - ADABAS dev. blocks overall architecture
  - Licensing cost in case of Infrastructure changes
SOLUTION - MIGRATION

- Modern Systems
- ATERAS
- Anubex

- Provide Migration solutions like Converting the ADABAS to SQL database
THANK YOU!