IBM DB2 at UW
(a mini-tutorial)

School of Computer Science
University of Waterloo
DB2: what is it?

DB2 is a relational DBMS and a set of tools:
- a command-line interface to SQL
- an ESQL preprocessor for C language

This tutorial covers (briefly):
- How do I run it?
- Useful hints
- What if something goes wrong?

DB2 documentation:
⇒ will be available on-line from the course web page
First Steps

- **DB2 is available on** `linux.student.cs.uwaterloo.ca`
  `ubuntu1604-002.student.cs.uwaterloo.ca`
  `ubuntu1604-006.student.cs.uwaterloo.ca`
  `ubuntu1804-008.student.cs.uwaterloo.ca`

- **your environment should be set up correctly:**
  
  **sh, bash, et al:**
  
  ```
  $ source ~db2inst2/sqlllib/db2profile
  ```

  **csh, tcsh, et al:**
  
  ```
  $ source ~db2inst2/sqlllib/db2cshrc
  ```

- **you don’t need any DB2 password**

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**Every CS348 student must have an account on** `linux.student.cs`
First Steps (example)

softbase.cs$ ssh ubuntu1604-002.student.cs.uwaterloo.ca
[...]
$ source ~db2inst2/sql1lib/db2profile
$ db2
(c) Copyright IBM Corporation 1993,2007
Command Line Processor for DB2 Client 11.1.1.1

[...]

For more detailed help, refer to the Online Reference Manual.

db2 =>
Connecting to a Database

`db2 => connect to cs348`

Database Connection Information

- Database server = DB2/LINUXX8664 11.1.1.1
- SQL authorization ID = DAVID
- Local database alias = CS348

`db2 =>`

**cs348** is the name of a database managed by DB2 for this class
Executing Queries

SQL statements can be entered directly at the `db2 =>` prompt.

```
db2 => select aid, name \
db2 (cont.) => from david.author

<table>
<thead>
<tr>
<th>AID</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toman, David</td>
</tr>
<tr>
<td>2</td>
<td>Chomicki, Jan</td>
</tr>
<tr>
<td>3</td>
<td>Saake, Gunter</td>
</tr>
</tbody>
</table>

3 record(s) selected.
```

ending line with \ allows entering long queries
ending with (<cr>) executes the query.

****** you will need this for your Assignments ******
## What tables are there?

```
db2 => list tables

<table>
<thead>
<tr>
<th>Table/View</th>
<th>Schema</th>
<th>Type</th>
<th>Creation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTICLE</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.39</td>
</tr>
<tr>
<td>AUTHOR</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.36</td>
</tr>
<tr>
<td>BOOK</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.37</td>
</tr>
<tr>
<td>JOURNAL</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.38</td>
</tr>
<tr>
<td>PROCEEDINGS</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.38</td>
</tr>
<tr>
<td>PUBLICATION</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.36</td>
</tr>
<tr>
<td>WROTE</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.37</td>
</tr>
</tbody>
</table>

7 record(s) selected.
```
Is that all?

db2 => list tables for all

<table>
<thead>
<tr>
<th>Table/View</th>
<th>Schema</th>
<th>Type</th>
<th>Creation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTICLE</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.39</td>
</tr>
<tr>
<td>AUTHOR</td>
<td>DAVID</td>
<td>T</td>
<td>2008-05-08-15.53.36</td>
</tr>
<tr>
<td>COLCHECKS</td>
<td>SYSCAT</td>
<td>V</td>
<td>1999-09-10-10.55.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSTABLES</td>
<td>SYSIBM</td>
<td>T</td>
<td>1999-09-10-10.55.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSVIEWS</td>
<td>SYSIBM</td>
<td>T</td>
<td>1999-09-10-10.55.12</td>
</tr>
<tr>
<td>COLDIST</td>
<td>SYSSTAT</td>
<td>V</td>
<td>1999-09-10-10.55.39</td>
</tr>
<tr>
<td>COLUMNS</td>
<td>SYSSTAT</td>
<td>V</td>
<td>1999-09-10-10.55.39</td>
</tr>
<tr>
<td>FUNCTIONS</td>
<td>SYSSTAT</td>
<td>V</td>
<td>1999-09-10-10.55.39</td>
</tr>
<tr>
<td>INDEXES</td>
<td>SYSSTAT</td>
<td>V</td>
<td>1999-09-10-10.55.40</td>
</tr>
<tr>
<td>TABLES</td>
<td>SYSSTAT</td>
<td>V</td>
<td>1999-09-10-10.55.40</td>
</tr>
</tbody>
</table>

146 record(s) selected.
HELP (built in)

```
db2 => ?

ACTIVATE DATABASE  ECHO  PREP/PRECOMPILE
ADD DATALINKS MANAGER EXPORT  PRUNE HISTORY/LOGFILE
ADD NODE  FORCE APPLICATION  QUERY CLIENT
ATTACH  GET/RESET/UPDATE ADMIN CFG  QUIESCE TABLESPACES
ATTACH TO  GET AUTHORIZATIONS  QUIT
BACKUP DATABASE  GET CONNECTION STATE  REBIND
BIND  GET INSTANCE  RECONCILE
CATALOG APPC NODE  GET MONITOR SWITCHES  REDISTRIBUTE NODEGROUP
CATALOG APPCLU NODE  GET SNAPSHOT  REFRESH LDAP
CATALOG APPN NODE  GET/RESET/UPDATE CLI CFG  REGISTER
CATALOG DATABASE  GET/RESET/UPDATE DB CFG  RELEASE
CATALOG DCS DATABASE  GET/RESET/UPDATE DBM CFG  REORG TABLE
CATALOG GLOBAL DATABASE  HELP  REORGCHK
CATALOG IPXSPX NODE  IMPORT  RESET MONITOR
CATALOG LDAP DATABASE  INITIALIZE TAPE  RESTART DATABASE
CATALOG LDAP NODE  INVOKE  RESTORE DATABASE

[...]
```

Note: Some commands are operating system specific and may not be available.

For further help: ? db2-command  - help for specified command
? OPTIONS  - help for all command options
? HELP  - help for reading help screens

The preceding three options can be run as DB2 <option> from an OS prompt.

**Scary, but very comprehensive help system**
What do these funny error codes (e.g., DB21034E) mean??

db2 => blah blah
DB21034E The command was processed as an SQL statement because it was not a valid Command Line Processor command. During SQL processing it returned: SQL0104N An unexpected token "blah" was found following "BEGIN-OF-STATEMENT". Expected tokens may include: "<values>". SQLSTATE=42601

db2 => ? DB21034E

DB21034E The command was processed as an SQL statement because it was not a valid Command Line Processor command. During SQL processing it returned:

Explanation: This message is displayed before the SQL error message. The error may be caused by a syntax error in a non-SQL command.

User Response: Correct the error and resubmit the command.
**Command Line Usage**

**Syntax:** `db2 <command>`

```bash
$ db2 list tables

<table>
<thead>
<tr>
<th>Table/View</th>
<th>Schema</th>
<th>Type</th>
<th>Creation time</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTICLE</td>
<td>DAVID</td>
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<td>DAVID</td>
<td>T</td>
<td>2000-05-08-15.53.38</td>
</tr>
<tr>
<td>PROCEEDINGS</td>
<td>DAVID</td>
<td>T</td>
<td>2000-05-08-15.53.38</td>
</tr>
<tr>
<td>PUBLICATION</td>
<td>DAVID</td>
<td>T</td>
<td>2000-05-08-15.53.36</td>
</tr>
<tr>
<td>WROTE</td>
<td>DAVID</td>
<td>T</td>
<td>2000-05-08-15.53.37</td>
</tr>
</tbody>
</table>

7 record(s) selected.
```

special characters (e.g., `*`) have to be quoted
Scripts

To run code from a file `batch.file` use:

```
$ db2 -f batch.file

<DB2 messages here; input is NOT echoed>
```

Sample SQL from classes `samples<n>.db2`
Results `results<n>.db2` ⇒ all from the “lectures” web page

This will be necessary for submitting your SQL assignments: you’ll have to submit an `a<n>.sql` file which will then be *tested* by the TAs using the above.
Problems

Look if DB2 is running (this is how a healthy DB2 looks like):

```
$ ps -ef | grep db2
```

```
db2inst2  4896  1  0 May18 ?  00:00:03 /lib/systemd/...
db2inst2  4897  4896  0 May18 ?  00:00:00 (sd-pam)
root     5110  1  0 May18 ?  00:00:00 db2wdog
db2inst2  5112  5110  0 May18 ?  00:02:51 db2sysc
root     5118  5110  0 May18 ?  00:00:00 db2ckpwd
root     5119  5110  0 May18 ?  00:00:00 db2ckpwd
root     5120  5110  0 May18 ?  00:00:00 db2ckpwd
db2inst2  5122  5110  0 May18 ?  00:00:00 db2vend (PD ...
db2inst2  5131  5110  0 May18 ?  00:00:26 db2acd ,0,...
db2fenc2  14139 5110  0 May18 ?  00:00:00 db2fmp ( ,1,...
david    23997  1  0 15:06 pts/12  00:00:00 /home/db2inst2/...
david    26239 22796  0 15:09 pts/12  00:00:00 grep db2
```

Contact the TAs or CFCF consultants if you can’t access DB2.