

Backup, Law, Ethics

This week:

- Backing up:
 - MySQL
 - SQL Server
- Law
- Ethics

Backup – SQL Server

All DataBase Management Systems, (DBMSs) offers backup options

Backup is essential to keep data safe in case of:

- Physical damage to **location**
- Physical damage to **server**
- **Disk failure**
- Unintentional **hack** that changes / remove data
- *and* many other dangers that you can think of and some you can't



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What Is *and* Isn't Backup?

- It is:

“The process of periodically copying of the database and log file (and possibly programs) to offline storage media”

Connolly and Begg, p.526

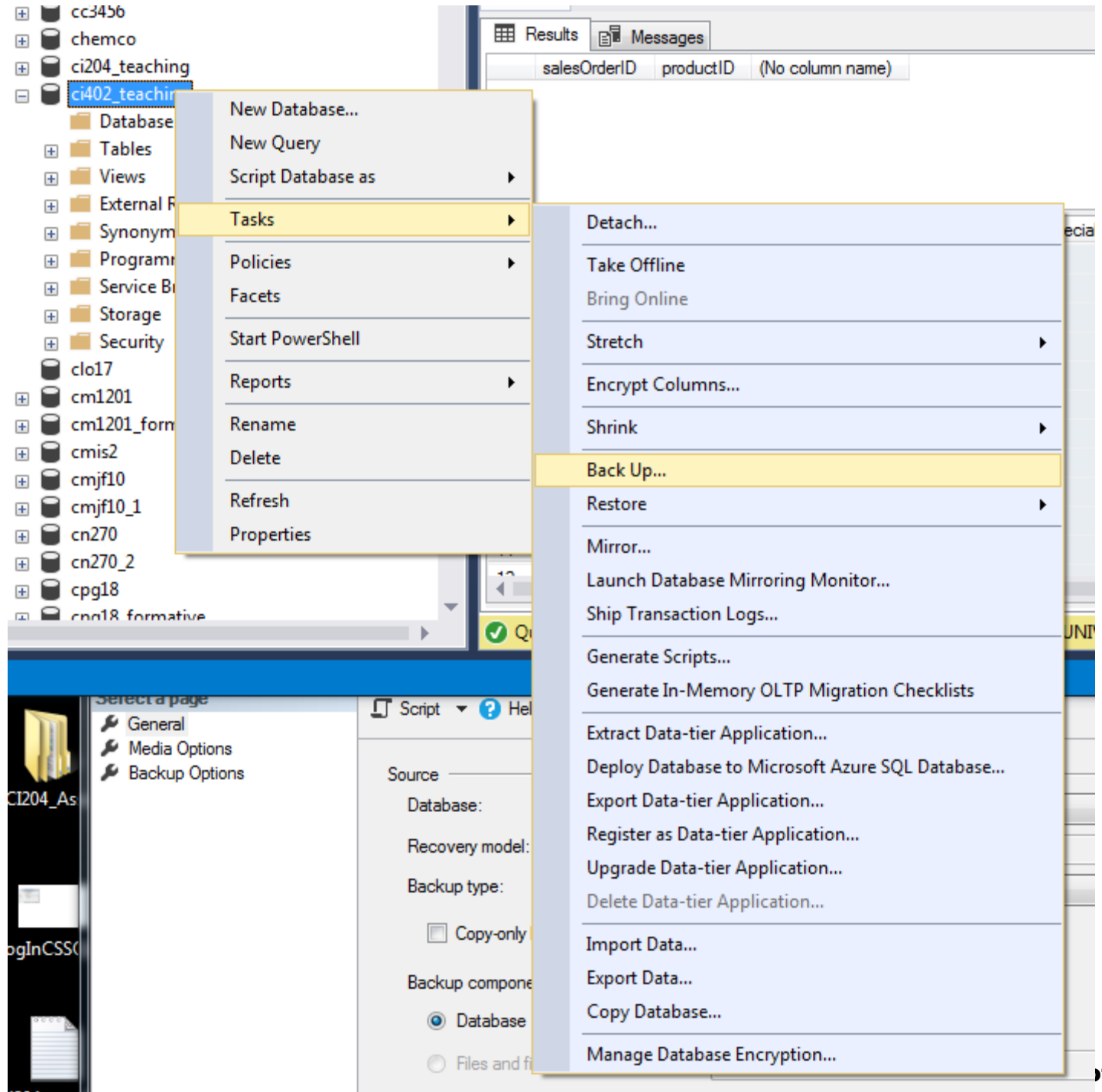
- It isn't:

“It's not a backup file unless you have tested that you can restore it – it's a just a file that lives somewhere else”

Former colleague of Jennie's

How To Backup – SQL Server

- Right click on your database – select *Tasks->Backup*
- You can backup to:
 - URL
 - Disk
 - Other archive e.g. tape etc.
- Displays *Back Up Database* dialogue



Back Up Database - ci402_teaching

Select a page

- General
- Media Options
- Backup Options

Script ? Help

Source

Database: ci402_teaching

Recovery model: SIMPLE

Backup type: Full

☐ Copy-only backup

Backup component:

☒ Database

☐ Files and filegroups:

Destination

Back up to: Disk

D:\Microsoft SQL Server\MSSQL14.CSSQL\MSSQL\Backup\ci402_teaching.bak

Add...

Remove

Contents

Connection

Server: cssql

Connection: UNIVERSITY\jh1033

[View connection properties](#)

Progress

Ready

OK Cancel

How To Backup – SQL Server

- I have chosen a *full* backup (everything)
- Can't change path (it's the Database Administrator that sets this – why?)
- You may not be able to do this (permissions), so pictures here
- Creates **.bak* file – generic backup file extension, could be created by many programs, no ONE program can open them all

How To Restore – SQL Server

- Right click on database, select *Tasks->Restore*
- Can click on *Timeline* button to see history of backups

Restore Database - jh1033_402

A tail-log backup of the source database will be taken. View this setting on the Options page.

Select a page

- General
- Files
- Options

Script
Help

Source

☒ Database:
jh1033_402

☐ Device:

Database:

Destination

Database:
jh1033_402

Restore to:
The last backup taken (02 December 2019 08:40:10)
Timeline...

Restore plan

Backup sets to restore:

Restore	Name	Component	Type	Server	Database	Position
<input checked="" type="checkbox"/>	jh1033_402-Full Database Backup	Database	Full	CEM-DB-PRO01	jh1033_402	1

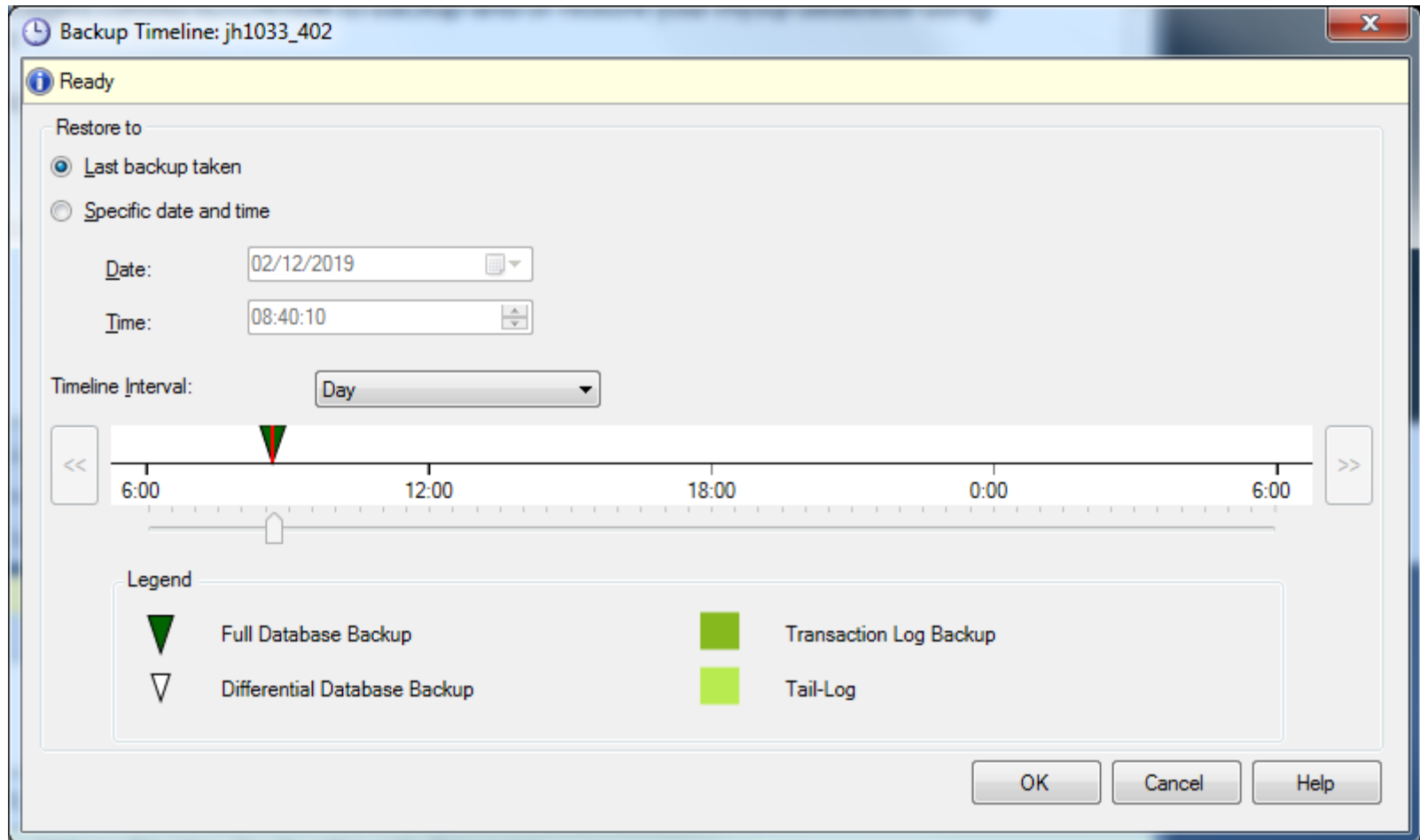
Verify Backup Media

Connection
cssql [UNIVERSITY\jh1033]
View connection properties

Progress

Ready

OK
Cancel
Help



Backup Log File Example

Process Monitor - Sysinternals: www.sysinternals.com						
File Edit Event Filter Tools Options Help						
Time ...	Process Name	PID	Operation	Path	Result	Detail
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 1,441,792, Length: 65,536, I/O Flags: Non-
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 720,896, Length: 65,536, I/O Flags: Non-
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 28,508,160, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 20,381,696, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 28,377,088, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 3,473,408, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 21,823,488, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 60,817,408, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\master.mdf	SUCCESS	Offset: 3,407,872, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\master.mdf	SUCCESS	Offset: 2,162,688, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 28,246,016, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 14,811,136, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 6,946,816, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 63,242,240, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 458,752, Length: 65,536, I/O Flags: Non-
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 1,507,328, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\Program Files\Microsoft SQL Server\MSSQL10_50.MSSQLSERVER\MSSQ...	SUCCESS	Offset: 63,307,776, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	WriteFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\mastlog.ldf	SUCCESS	Offset: 139,264, Length: 4,096, I/O Flags: Non-c
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 1,114,112, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 1,638,400, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 8,978,432, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 9,502,720, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 8,716,288, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 5,505,024, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 3,801,088, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 11,337,728, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 11,010,048, Length: 65,536, I/O Flags: N
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 4,849,664, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 5,111,808, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 4,390,912, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 3,735,552, Length: 65,536, I/O Flags: Noi
8:48:0...	sqlservr.exe	1860	ReadFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\MSDBData.mdf	SUCCESS	Offset: 11,468,800, Length: 65,536, I/O Flags: N
8:48:1...	sqlservr.exe	1860	RegQueryKey	HKLM	SUCCESS	Query: HandleTags, HandleTags: 0x0
8:48:1...	sqlservr.exe	1860	RegOpenKey	HKLM\SYSTEM\CurrentControlSet\Services\EventLog\Security	REPARSE	Desired Access: Read/Write
8:48:1...	sqlservr.exe	1860	RegOpenKey	HKLM\System\CurrentControlSet\Services\EventLog\Security	ACCESS DENIED	Desired Access: Read/Write
8:48:1...	sqlservr.exe	1860	WriteFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\Log\ERRORLOG	SUCCESS	Offset: 16,400, Length: 328
8:48:1...	sqlservr.exe	1860	WriteFile	C:\SQLskills\MSSQL10_50.MSSQLSERVER\MSSQL\DATA\mastlog.ldf	SUCCESS	Offset: 143,360, Length: 4,096, I/O Flags: Non-c
8:48:2...	sqlservr.exe	1860	Thread Exit		SUCCESS	Thread ID: 1672, User Time: 0.0000000, Kernel
8:48:2...	sqlservr.exe	1860	Thread Create		SUCCESS	Thread ID: 4012
8:48:5...	sqlservr.exe	1860	RegQueryKey	HKLM	SUCCESS	Query: HandleTags, HandleTags: 0x0

Showing 19,687 of 1,119,179 events (1.7%)

Backed by virtual memory

MySQL – Backup - Simple

The screenshot shows the phpMyAdmin web interface in a browser. On the left, the database structure tree is expanded for 'jh1033_402', showing tables like 'tArchiveCust', 'tCust', 'tCust2', 'tCust3', 'tOrder', 'tOrderLine', and 'tProduct'. The 'Export' tab is selected in the top navigation bar. The main area displays 'Exporting tables from "jh1033_402" database'. Under 'Export method:', the 'Quick' option is selected. Under 'Format:', 'SQL' is chosen in a dropdown menu. A 'Go' button is visible at the bottom of the export options. The browser's address bar shows the URL 'localhost/phpMyAdmin/db_export.php?db=jh1033_402'.

1. Check you have selected the right database

2. Go to Export

3. Click Go

4. Find file in downloads (will be called *jh1033_402.sql*)

MySQL – Simple - Restore

1. Create empty (new) db
(mine's called
jh1033_402_restore_test)

2. Select
Import

3. Choose
file you just
exported

The screenshot shows the phpMyAdmin web interface. On the left, the 'Recent' sidebar lists databases, with 'jh1033_402_restore_test' selected. The main panel displays the 'Import' screen for this database. The title is 'Importing into the database "jh1033_402_restore_test"'. Below this, the 'File to import:' section provides instructions on file formats (gzip, bzip2, zip, or uncompressed) and gives an example: '.sql.zip'. A 'Browse your computer:' button is followed by the text 'Choose file' and 'jh1033_402.sql.gz'. A note indicates a maximum file size of 150MiB. Below this, a dropdown menu for 'Character set of the file:' is set to 'utf-8'. The 'Partial import:' section is partially visible at the bottom.

MySQL – Simple - Issues

- Will back up *data* and *structure* (tables) – fine to restore to existing db
- Won't include *primary keys, constraints* etc. (only includes *data, field* and *table names* etc.)
- To do this, first export table structure (not data), then run SQL to create table in new db
- Then export data itself e.g. to CSV format
- Then import data to new tables (see week 1 for more info – it's how you set up original db)

MySQL – Script Table

Ensure in original db

Breadcrumb trail shows in db, not table

Select table

Write SQL to create table with keys etc.

Already run script to tCust (in new table)

phpMyAdmin

Server: localhost:3306 » Database: jh1033_402

Structure SQL Search Query Export More

Table

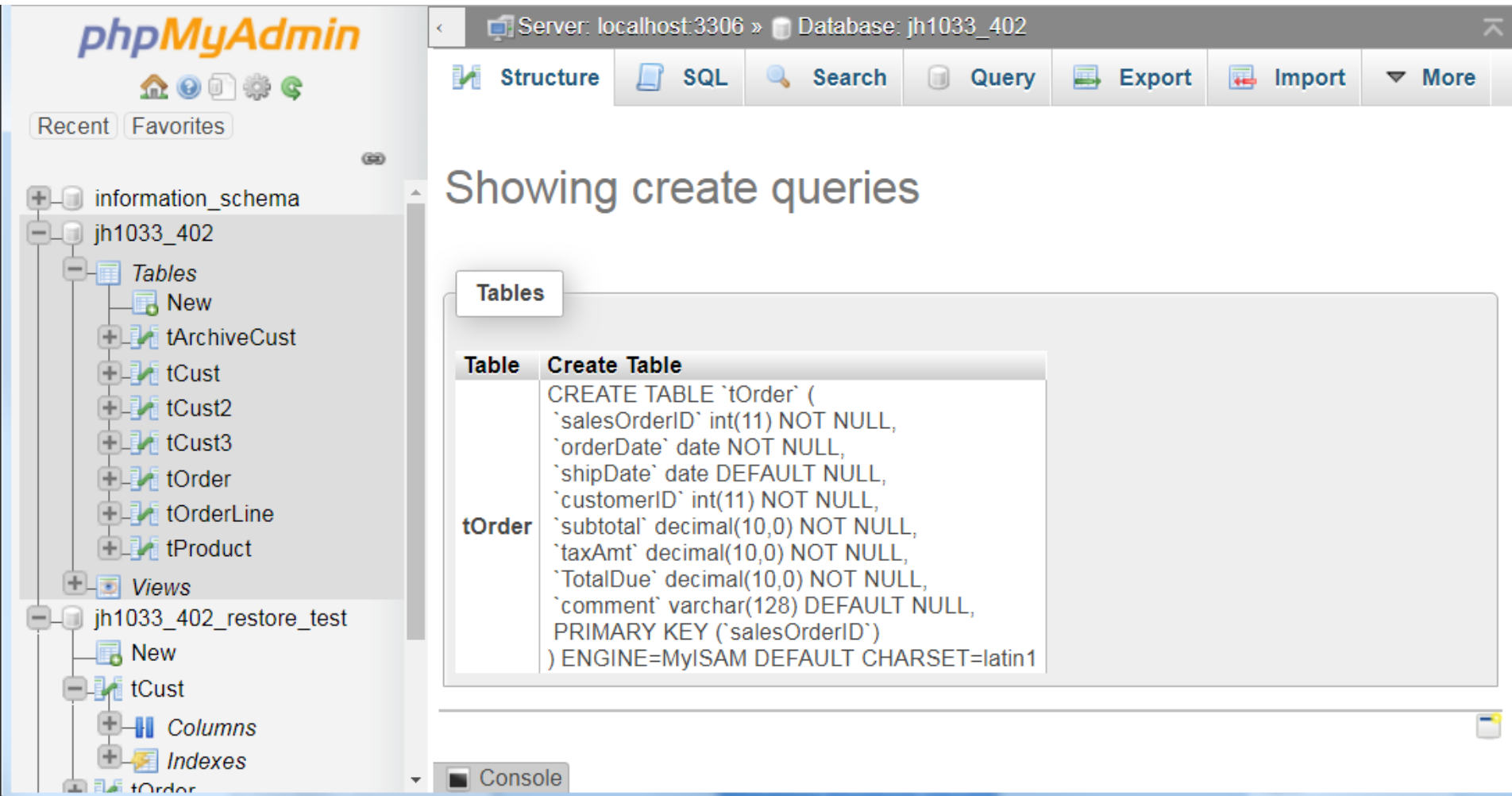
<input type="checkbox"/>	tArchiveCu	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	tCust	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	tCust2	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	tCust3	★	Browse	Structure	Search	Insert	Empty	Drop
<input checked="" type="checkbox"/>	tOrder	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	tOrderLine	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	tProduct	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	vCustOrderDisplay	★	Browse	Structure	Search	Insert	Empty	Drop
<input type="checkbox"/>	vtCust	★	Browse	Structure	Search	Insert	Empty	Drop

9 tables Sum

Check all / Check tables having overhead

With selected:
With selected:
Copy table
Show create
Export

MySQL – Script Table – Copy and Run in New db to Create Empty Table (Next Slide)



The screenshot displays the phpMyAdmin web interface. On the left, the database structure tree shows the 'jh1033_402' database with a 'Tables' folder expanded, listing 'tArchiveCust', 'tCust', 'tCust2', 'tCust3', 'tOrder', 'tOrderLine', and 'tProduct'. The 'tOrder' table is selected. The main panel shows the 'Structure' tab with a 'Script Table' button. Below this, a 'Showing create queries' window is open, displaying the SQL code for creating the 'tOrder' table. The code is as follows:

```
CREATE TABLE `tOrder` (  
  `salesOrderID` int(11) NOT NULL,  
  `orderDate` date NOT NULL,  
  `shipDate` date DEFAULT NULL,  
  `customerID` int(11) NOT NULL,  
  `subtotal` decimal(10,0) NOT NULL,  
  `taxAmt` decimal(10,0) NOT NULL,  
  `TotalDue` decimal(10,0) NOT NULL,  
  `comment` varchar(128) DEFAULT NULL,  
  PRIMARY KEY (`salesOrderID`)  
) ENGINE=MyISAM DEFAULT CHARSET=latin1
```

The interface also includes a 'Console' tab at the bottom.

MySQL – Create Tables

The screenshot displays the phpMyAdmin web interface. On the left, the database structure tree shows the 'jh1033_402_restore_test' database selected, with tables 'tCust', 'tOrder', 'tOrderLine', and 'tProduct' listed. The main panel on the right shows the 'Structure' tab for the 'tOrder' table. It displays the table's schema with columns: 'salesOrderID' (int(11), NOT NULL, PRIMARY KEY), 'orderDate' (date, NOT NULL), 'shipDate' (date, DEFAULT NULL), 'customerID' (int(11), NOT NULL), 'subtotal' (decimal(10,0), NOT NULL), 'taxAmt' (decimal(10,0), NOT NULL), 'TotalDue' (decimal(10,0), NOT NULL), and 'comment' (varchar(128), DEFAULT NULL). Below the schema, a message states: 'MySQL returned an empty result set (i.e. zero rows). (Query took 0.0016 seconds.)'. The 'CREATE TABLE' SQL statement is shown, followed by links for '[Edit inline]', '[Edit]', and '[Create PHP code]'. The same process is repeated for the 'tOrderLine' table, with a message indicating 'MySQL returned an empty result set (i.e. zero rows). (Query took 0.0019 seconds.)' and the corresponding SQL statement. The 'tProduct' table creation is partially visible at the bottom.

phpMyAdmin

Recent Favorites

information_schema

jh1033_402

jh1033_402_restore_test

- New
- tCust
- tOrder
- tOrderLine
- tProduct

jh1033_504

jh1033_test

Server: localhost:3306 » Database: jh1033_402_restore_test

Structure SQL Search Query Export

MySQL returned an empty result set (i.e. zero rows). (Query took 0.0016 seconds.)

```
CREATE TABLE `tOrder` ( `salesOrderID` int(11) NOT NULL, `orderDate` date NOT NULL, `shipDate` date DEFAULT NULL, `customerID` int(11) NOT NULL, `subtotal` decimal(10,0) NOT NULL, `taxAmt` decimal(10,0) NOT NULL, `TotalDue` decimal(10,0) NOT NULL, `comment` varchar(128) DEFAULT NULL, PRIMARY KEY (`salesOrderID`) ) ENGINE=MyISAM DEFAULT CHARSET=latin1
```

[Edit inline] [Edit] [Create PHP code]

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0016 seconds.)

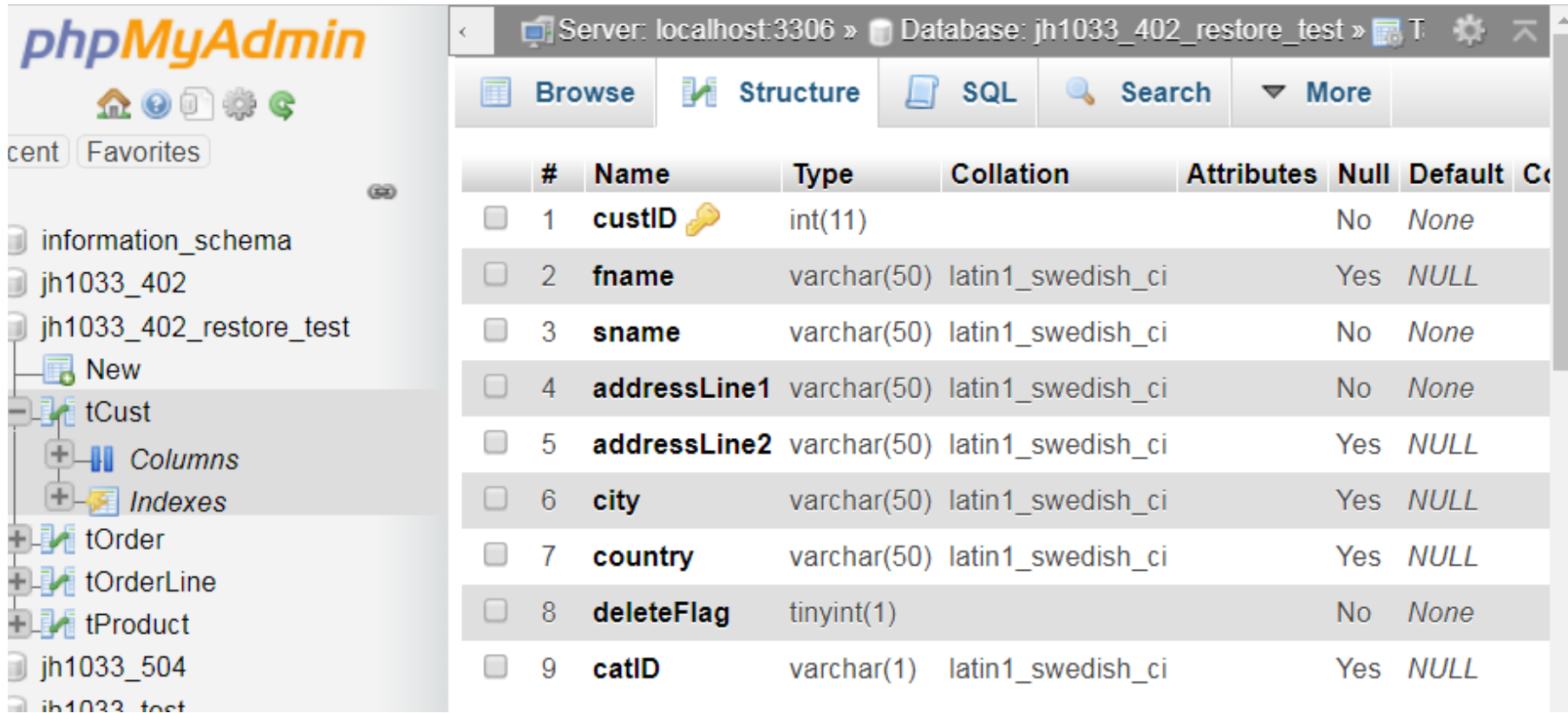
```
CREATE TABLE `tOrderLine` ( `SalesOrderID` int(11) NOT NULL, `CarrierTrackingNumber` varchar(25) DEFAULT NULL, `OrderQty` smallint(6) NOT NULL, `ProductID` int(11) NOT NULL, `SpecialOfferID` int(11) NOT NULL, `UnitPrice` decimal(10,0) NOT NULL, `UnitPriceDiscount` decimal(10,0) NOT NULL, `LineTotal` decimal(38,6) NOT NULL, PRIMARY KEY (`SalesOrderID`, `ProductID`) ) ENGINE=MyISAM DEFAULT CHARSET=latin1
```

[Edit inline] [Edit] [Create PHP code]

✓ MySQL returned an empty result set (i.e. zero rows). (Query took 0.0019 seconds.)

```
CREATE TABLE `tProduct` ( `ProductID` int(11) NOT NULL, `Name` varchar(50)
```

MySQL – New Table with PK



The screenshot shows the phpMyAdmin interface. On the left, the database 'jh1033_402_restore_test' is selected, and the table 'tCust' is highlighted. The 'Structure' tab is active, displaying the table's schema. The table has 9 columns. The first column, 'custID', is the primary key (indicated by a key icon).

#	Name	Type	Collation	Attributes	Null	Default	Co
1	custID	int(11)			No	None	
2	fname	varchar(50)	latin1_swedish_ci		Yes	NULL	
3	sname	varchar(50)	latin1_swedish_ci		No	None	
4	addressLine1	varchar(50)	latin1_swedish_ci		No	None	
5	addressLine2	varchar(50)	latin1_swedish_ci		Yes	NULL	
6	city	varchar(50)	latin1_swedish_ci		Yes	NULL	
7	country	varchar(50)	latin1_swedish_ci		Yes	NULL	
8	deleteFlag	tinyint(1)			No	None	
9	catID	varchar(1)	latin1_swedish_ci		Yes	NULL	

MySQL – Populate Table With Import (see week one)

The screenshot shows the phpMyAdmin web interface in a browser. The address bar indicates the URL: `cpnl.brighton.domains/cpsess7605812869/3rdparty/phpMyAdmin/tbl_import.php?db=jh1033_402_restore_test&table=tCust`. The interface is for the database `jh1033_402_restore_test` and table `tCust`. The left sidebar shows a tree view of the database structure, including tables like `tCust`, `tCust2`, `tCust3`, `tOrder`, `tOrderLine`, `tProduct`, and views. The main panel is titled "Importing into the table 'tCust'" and contains the following sections:

- File to import:**
 - Text: "File may be compressed (gzip, bzip2, zip) or uncompressed. A compressed file's name must end in `.[format].[compression]`. Example: `.sql.zip`"
 - Browse your computer: `tCust.csv` (Max: 150MiB)
 - Text: "You may also drag and drop a file on any page."
 - Character set of the file:
- Partial import:**
 - ☒ Allow the interruption of an import in case the script detects it is close to the PHP timeout limit. (This might be a good way to import large files, however it can break transactions.)
- Console:** Number of queries (for SQL) starting from the first one:

Types of Backup

3 Main Types:

- *Full* – whole database, structure and tables
- *Incremental* or *Differential* – incremental copies data changed since last backup (not standalone) – differential is cumulative
- *Transactional Logs* – files showing all transactions (example on next slide)
- For more information on SQL Server backup (and some in general):
<https://docs.microsoft.com/en-us/sql/t-sql/statements/backup-transact-sql?view=sql-server-2017>
- For more information on MySQL backup:
<https://dev.mysql.com/doc/mysql-backup-excerpt/5.7/en/backup-and-recovery.html>

Backup Schedule

How often you do it depends on how often the db changes, how at risk it is, etc. etc.

But different types of backup need to be done in certain order – e.g.

- ***Sunday Midnight*** -- Do a *full* database backup.
- ***Every day at midnight*** -- Do a *differential* or *incremental* database backup.
- ***Every 15 minutes*** -- Do a *transaction log* backup

Backup Schedule

So, Wednesday lunchtime – database fails!!!



Restore:

- Previous Sundays FULL BACKUP
- Restore Monday and Tuesday's INCREMENTAL BACKUP *or* Tuesday's DIFFERENTIAL BACKUP
- Restore any TRANSACTIONAL LOGS

Can all be done automatically by SQL Server and with scripts / addons / extensions for MySQL

Legal Issues

Personal Data covered by:

- **Data Protection Act 2018 (DPA)** *is the*
- UK implementation of the EU **General Data Protection Regulation 2016**
- <https://www.gov.uk/data-protection>

Legal Issues - DPA – Personal Data

Personal Data is:

*“...any information relating to an identified or *identifiable natural person (‘data subject’); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a **name**, an **identification number**, location data, an online identifier or to one or more factors specific to the **physical, physiological, genetic, mental, economic, cultural or social identity** of that natural person”*

**identifiable means either directly or indirectly*

Source: ICO, 2019, *What is personal data*, [online] available at: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/what-is-personal-data/what-is-personal-data/> [accessed Dec 2019]

Legal Issues – DPA – Sensitive Data

Additionally , some data is *sensitive*, with extra protection, about an individual's:

- race;
- ethnic origin;
- political opinions;
- religious or philosophical beliefs;
- trade union membership;
- genetic data;
- biometric data (where this is used for identification purposes);
- health data;
- sex life; or
- sexual orientation
- criminal convictions / offenses

Legal Issues – DPA – Data Subject Rights

- be informed about how your data is being used
- access personal data
- have incorrect data updated
- have data erased
- stop or restrict the processing of your data
- data portability (allowing you to get and reuse your data for different services)
- object to how your data is processed in certain circumstances



You also have rights when an organisation is using your personal data for:

- automated decision-making processes (without human involvement)
- profiling, for example to predict your behaviour or interests

Data Ethics

- Growing field
- More than sticking to law
- Likely to grow due to *AI /Big Data* etc.
- Start point: Look at one of these case studies:
<https://aiethics.princeton.edu/case-studies/case-study-pdfs/>