

Building a CAPI Case management system for a small/medium size organization

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Overview

- Brief history of UWSC case management tools
 - How and why did we build our own system?
- Evolution to current system
 - Key features and components of current system
- Demonstration
- Q&A
- Go build / modify your own system

- UWSC uses CASES 5.5 for CATI, CAPI, and Data Entry
 - Data stored in proprietary CASES data format
 - No field case management tools in 5 series
- We now do several CAPI projects each year, but for years we did CATI and mail only

Our first CAPI project in 1996

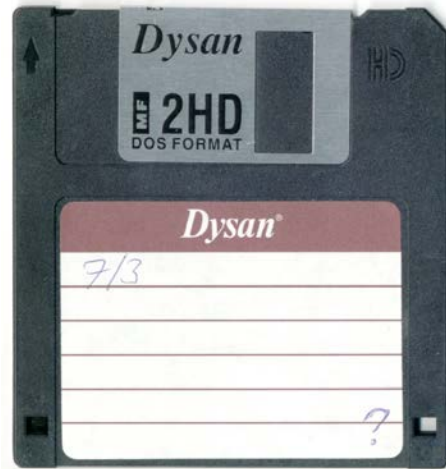
- How does a CATI organization manage a CAPI project?
- We'd like to use the CATI system we know
- But...CASES had no field case management tools...so we need to build our own

Essential CASES Programs

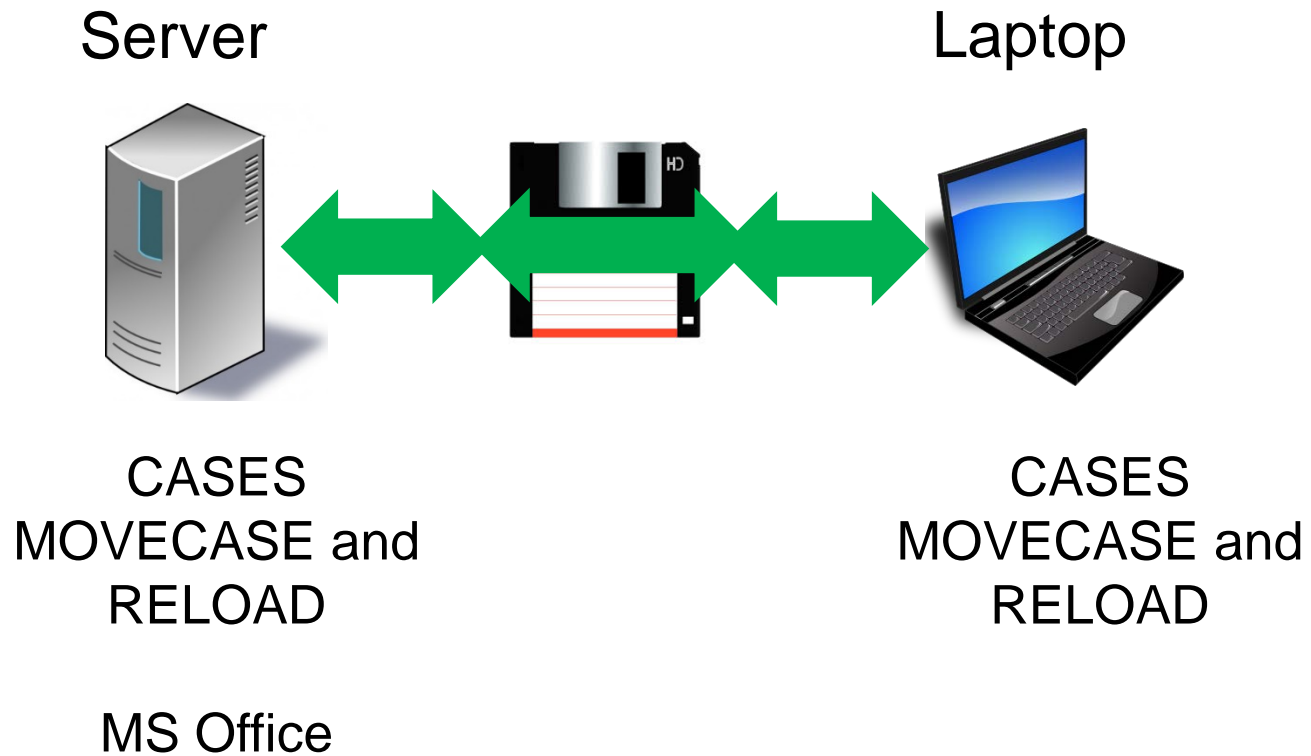
- OUTPUT: export data for fixed-width items to text files
- SHOWHIST: export data for open-ended items to text files
- MOVECASE: create archive files containing case data
- RELOAD: reload archive files containing case data

- If your system can do something like this you can build a system like the one we're about to describe

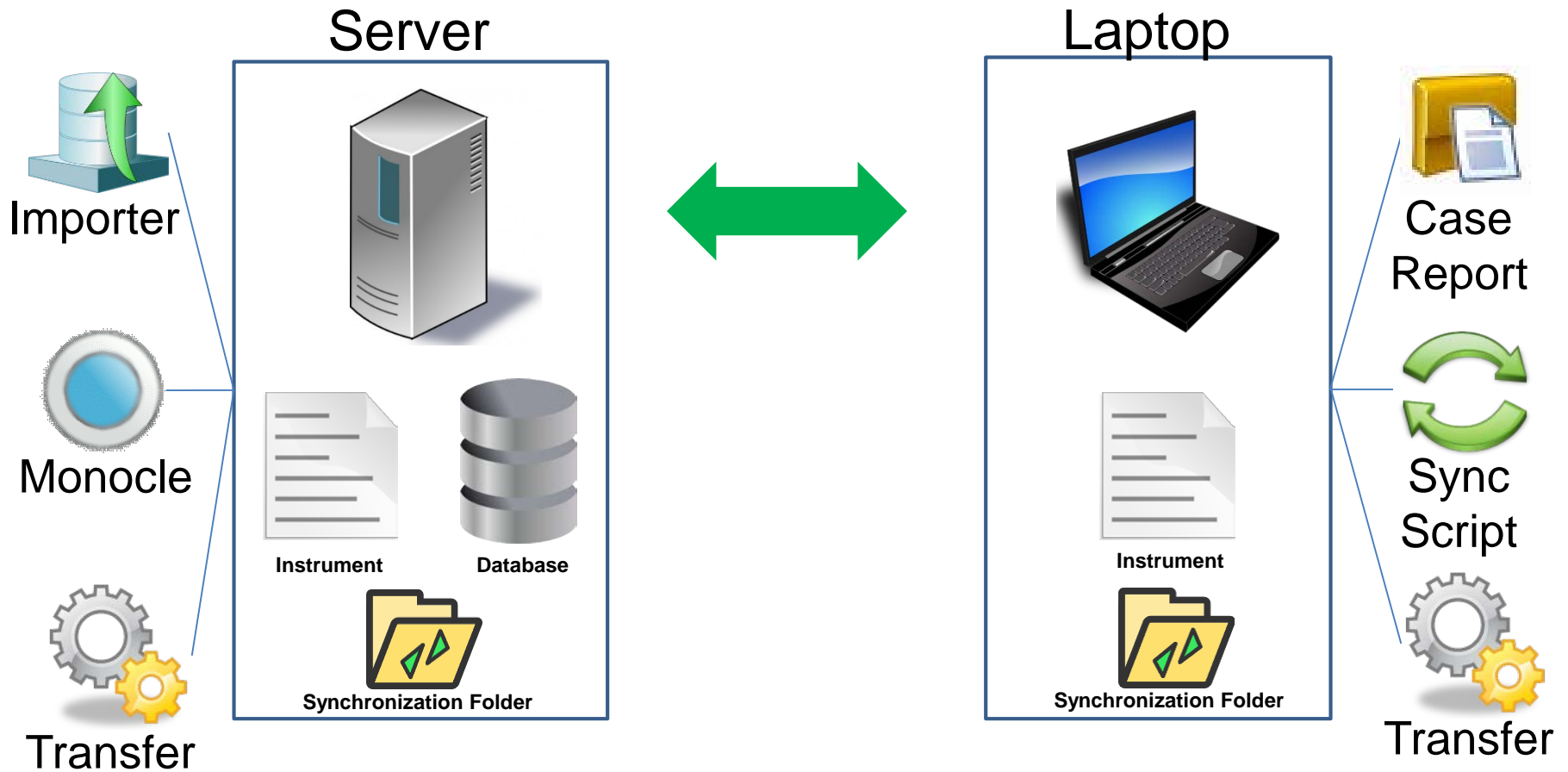
Paleolithic case management tools



Crude but effective



Modern Case Management Tools



Prerequisites - Server

Server

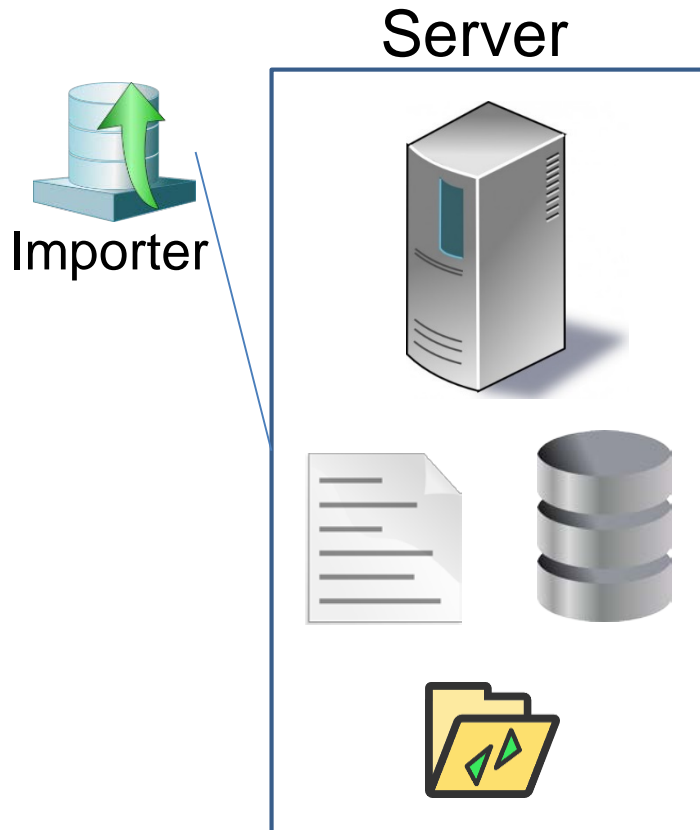




Prerequisites - Server

- Survey Instrument
 - CASES 5.5
 - Sample setup
- Database
 - MySQL
 - Schema configured for the study
 - Importer application configured to import data from survey into MySQL
- Synchronization folder structure

Importer Application



Importer Application



- Copies data from surveys into MySQL database
 - Makes data more readily available for case management and reporting tools
- Create text file containing survey data
 - Uses CASES programs OUTPUT and SHOWHIST
 - Only cases modified since last import
- Imports data from text files into MySQL
 - Creates or alters the MySQL table structure as needed

Importer



- Imports data for multiple projects

The screenshot displays the 'Import Processes' window of the Importer application. The window contains a table with the following columns: import_name, project_name, import_table, import_path, import_file_prefix, varlist_output, and varlist_showhist. Below the table is a 'History' tab showing a log of import activities.

import_name	project_name	import_table	import_path	import_file_prefix	varlist_output	varlist_showhist
P1004	P1004	DEDATA_P1004	Q:\projects\p100...	DEDATA	dedata_test.var	
p1097_prac_cases	p1097_prac	cases	X:\p1097\prac\ve...	p1097_c	cases.var	
p1097_prac_hist...	p1097_prac	history	X:\p1097\prac\ve...	p1097_h	history.var	
p1097_prod_cases	p1097_prod	cases	X:\p1097\prod\ve...	p1097_c	cases.var	
p1097_prod_hist...	p1097_prod	history	X:\p1097\prod\ve...	p1097_h	history.var	history_text.var
p1108_01	p1108_01	p1108_01	q:\projects\p110...	importer	importer.var	
p9710_prac_cas...	p9710_prac	cases	q:\projects\p971...	p9710_c	cases.var	
p9710_prac_hist...	p9710_prac	history	q:\projects\p971...	p9710_h	history.var	history_text.var
p9710_prac_inta...	p9710_prac	intake	q:\projects\p971...	p9710_intake	intake.var	
p9710_prod_cases	p9710_prod	cases	q:\projects\p971...	p9710_c	cases.var	
p9710_prod_hist...	p9710_prod	history	q:\projects\p971...	p9710_h	history.var	history_text.var
p9710_prod_intake	p9710_prod	intake	q:\projects\p971...	p9710_intake	intake.var	
p9904	p9904	DEDATA_P9904	Q:\projects\p990...	DEDATA	dedata_test.var	

History

```
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] importer instance collaborate 5/4/2015 6:00:00 AM
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] connected to shale.uwsc.wisc.edu:dantabase as user MDEUSER
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] running import process P1004
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] importing data from Q:\projects\p1004\prod\ve-inst into DEDATA_P1004
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] creating list of cases to import
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] running caselist
5/4/2015 10:17:03 AM [collaborate 5/4/2015 6:00:00 AM] checking import records
5/4/2015 10:18:11 AM [collaborate 5/4/2015 6:00:00 AM] finished checking import records for 3295 case(s)
5/4/2015 10:18:11 AM [collaborate 5/4/2015 6:00:00 AM] creating DEDATA.ids
5/4/2015 10:18:11 AM [collaborate 5/4/2015 6:00:00 AM] no cases will be imported
5/4/2015 10:18:11 AM [collaborate 5/4/2015 6:00:00 AM] finished
```

Import Processes



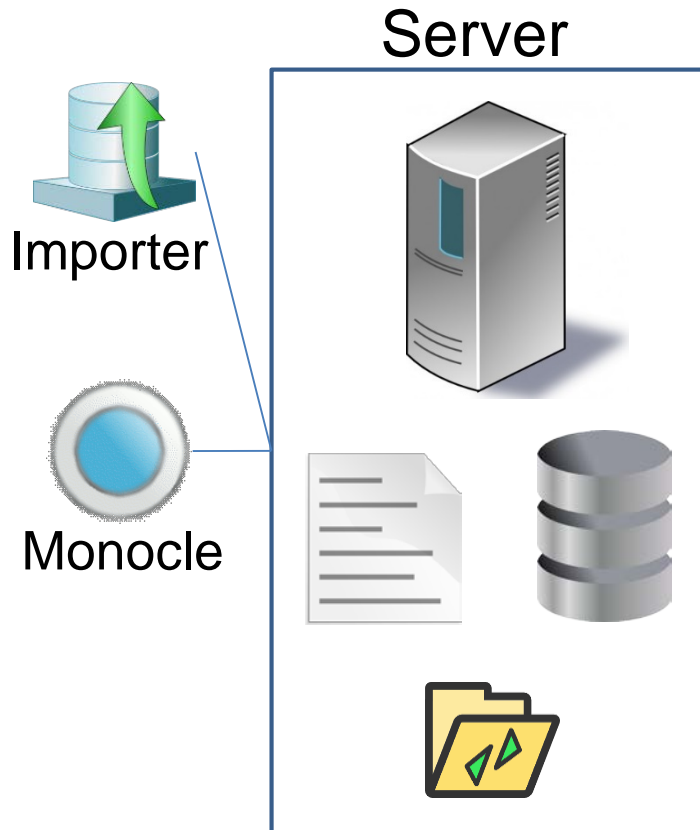
- Each process imports survey data into a single MySQL table
- A study may have multiple processes, importing data into separate tables
- Run in a separate thread every 5 minutes
- Import processes are defined in a MySQL table
 - Path to survey instrument
 - Name of files containing lists of variables to import
 - Name of table into which variables should be imported
 - Connection settings for database, with user and password encrypted
 - Run frequency



Import Monitor

- Perl script that runs continuously
- Runs on different server from the Importer
- Alerts users via email
 - Importer server is down
 - Idle processes
 - Errors encountered
 - When idle processes or errors are resolved
- Errors are typically caused by invalid items in variable lists

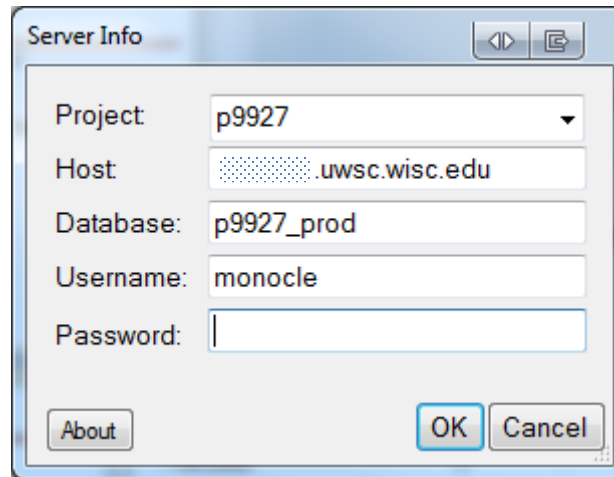
Monocle





- Custom software developed at the UW Survey Center
 - Stand-alone application that sits on top of databases
 - Data-collection-tool agnostic
- Provides a (very-close-to) real-time view into a project's data
- Used by project directors and supervisors
- Perform case assignment

Monocle – Login Screen



- Monocle has a login screen to allow users to connect to different studies

Monocle – Summary

The screenshot displays the Monocle software interface. The window title is "Monocle". The menu bar includes "File", "Edit", "View", "Reports", "Charts", and "Help". The "Import Status" is indicated as "Import Status" with a green checkmark. The main area is divided into two sections: "CAPI Progress" and "OutcomeCode Breakdown".

CAPI Progress

Sample	882
Worked	882
Refusals	7
Average Entries per Case	10.66
Completes	713
Ineligible	113
Partial Completes	0
Response Rate	0.9272

OutcomeCode Breakdown

Code	Cases	Text
211	1	FIRST REFUSAL, BY INFORMANT
212	1	FIRST REFUSAL, BY RESPONDENT
213	1	FIRST REFUSAL, PARTIAL INTERVIEW
221	2	SECOND REFUSAL, BY INFORMANT
222	2	SECOND REFUSAL, BY RESPONDENT
570	2	EMAIL/TEXT CONTACT
600	5	NO ANSWER
621	2	M.A.D. RESIDENTIAL OR UNCLEAR, MESSAGE LEFT
631	8	M.A.D. NONRESIDENTIAL, MESSAGE LEFT
632	1	M.A.D. NONRESIDENTIAL, NO MESSAGE LEFT
711	5	INTERVIEW APPOINTMENT SCHEDULED
800	1	NO ANSWER, NO MATERIALS LEFT
810	19	RE-CONTACT BY INFORMANT, NO APPT SCHEDULED
820	1	RE-CONTACT BY RESPONDENT, NO APPT SCHEDULED
850	2	NO INFORMATION, TRY DIFFERENT NUMBER

The status bar at the bottom left shows "p9927_prod".

Monocle – Caselist Tab

csid	id	Assigned ID	O-ID	Sessions	Code	Date	Time	Refusals	Count
60009	100	100	100	22	1110	9/12/2013	11:12:17	0	Kem
60017	100	100	100	9	810	9/5/2013	21:40:10	0	Kem
60025	100	100	100	6	631	9/11/2013	11:27:34	1	Kem
60026	100	100	100	16	1110	9/17/2013	18:33:00	0	Kem
60027	100	100	100	11	631	9/11/2013	11:52:31	0	Kem
60030	100	100	100	16	880	9/11/2013	12:03:33	0	Kem
70003	102	102	102	23	621	9/20/2013	01:35:53	0	Los A
70024	113	99	113	12	1110	6/20/2013	14:25:39	0	Los A
70119	113	99	113	9	1110	6/20/2013	14:22:09	0	Los A
70127	113	99	113	11	1110	7/6/2013	17:52:31	0	Los A
70131	113	99	113	7	1110	5/13/2013	21:33:06	0	Los A
70170	113	99	113	7	1110	6/20/2013	14:11:15	0	Orang
80012	118	118	118	26	1110	9/21/2013	22:45:52	0	San D
80021	118	118	118	8	631	9/19/2013	11:55:58	0	San D
80025	118	118	118	17	1110	9/12/2013	19:38:43	0	San D
80027	118	118	118	12	1110	9/9/2013	22:04:41	0	San D
80039	118	118	118	18	711	9/19/2013	17:50:27	0	San D
60035	117	117	117	44	1110	9/20/2013	17:43:25	1	Rivers

882 records (1 selected)

p9927_prod

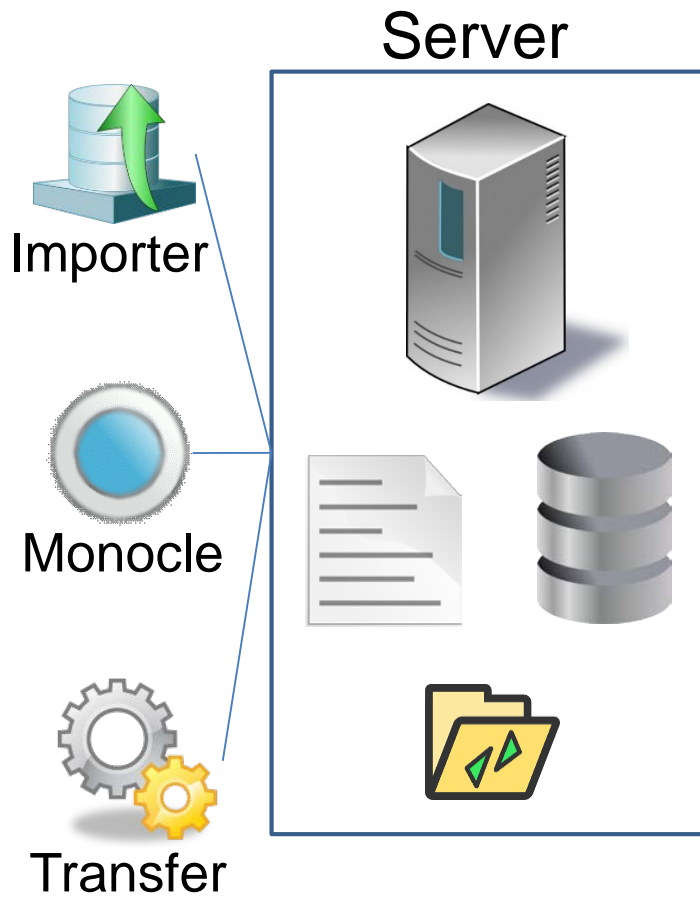
Monocle – Assign Case

The screenshot shows the Monocle software interface. A dialog box is open in the foreground, displaying the message: "Case 60009 is currently assigned to interviewer 100. You can reassign it to any of these interviewers:". Below the message is a dropdown menu with "100" selected. At the bottom of the dialog box, there is a checkbox labeled "Force Ownership to Server" which is currently unchecked, and two buttons: "Assign" and "Cancel".

The background shows a data table with the following columns: csid, Code, Date, Time, Refusals, and County. The table contains 882 records, with 1 record selected (csid 60009). The status bar at the bottom indicates "882 records (1 selected)" and "p9927_prod".

csid	Code	Date	Time	Refusals	County
60009	1110	9/12/2013	11:12:17	0	Kem
60017	810	9/5/2013	21:40:10	0	Kem
60025	631	9/11/2013	11:27:34	1	Kem
60026	1110	9/17/2013	18:33:00	0	Kem
60027	631	9/11/2013	11:52:31	0	Kem
60030	880	9/11/2013	12:03:33	0	Kem
70003	621	9/20/2013	01:35:53	0	Los Angele
70024	1110	6/20/2013	14:25:39	0	Los Angele
70119	1110	6/20/2013	14:22:09	0	Los Angele
70127	1110	7/6/2013	17:52:31	0	Los Angele
70131	1110	5/13/2013	21:33:06	0	Los Angele
70170	1110	6/20/2013	14:11:15	0	Orange
80012	1110	9/21/2013	22:45:52	0	San Diego
80021	631	9/19/2013	11:55:58	0	San Diego
80025	1110	9/12/2013	19:38:43	0	San Diego
80027	1110	9/9/2013	22:04:41	0	San Diego
80039	711	9/19/2013	17:50:27	0	San Diego
60035	1110	9/20/2013	17:43:25	1	Riverside

Transfer Application - Server



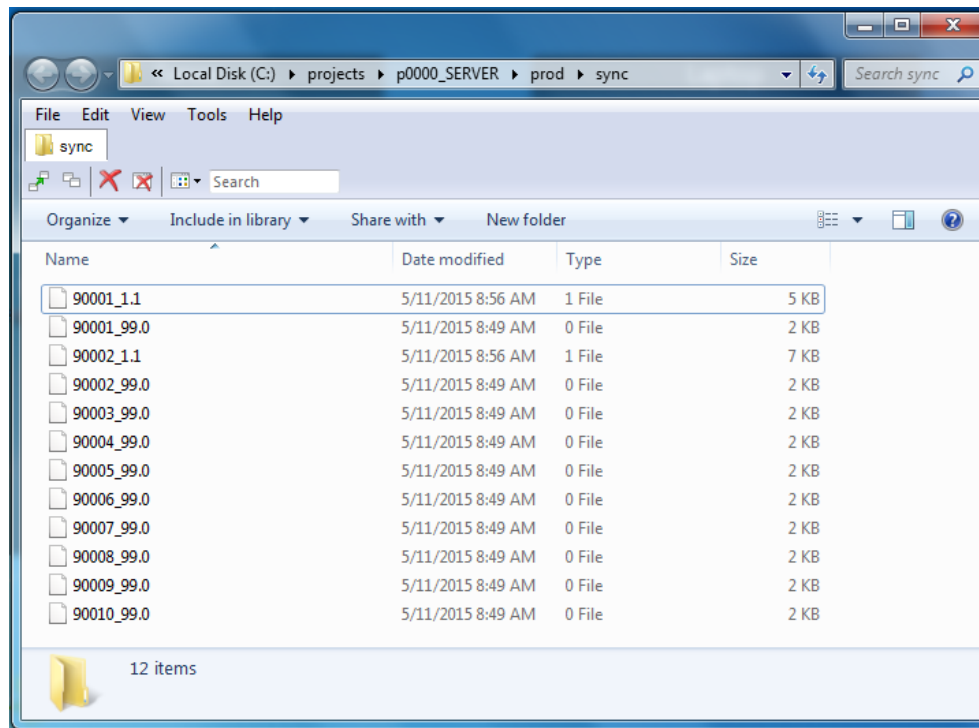


Transfer Application – Server

- Manages files containing survey data
 - Used to copy data between server and laptops
 - Runs on the server and the laptops
- Scheduled task on the server
 - Configured to run every 5 minutes
- Creates and reloads files containing archived data from surveys
 - Uses CASES program MOVECASE to create files
 - Uses CASES program RELOAD to reload files, importing data into the survey instrument
 - We refer to these as transfer files

Transfer File

- Contains an archive of all survey data for a single case
 - Includes all activity up to and including the most recent session
- File name is [caseid]_[user ID number].[session number]

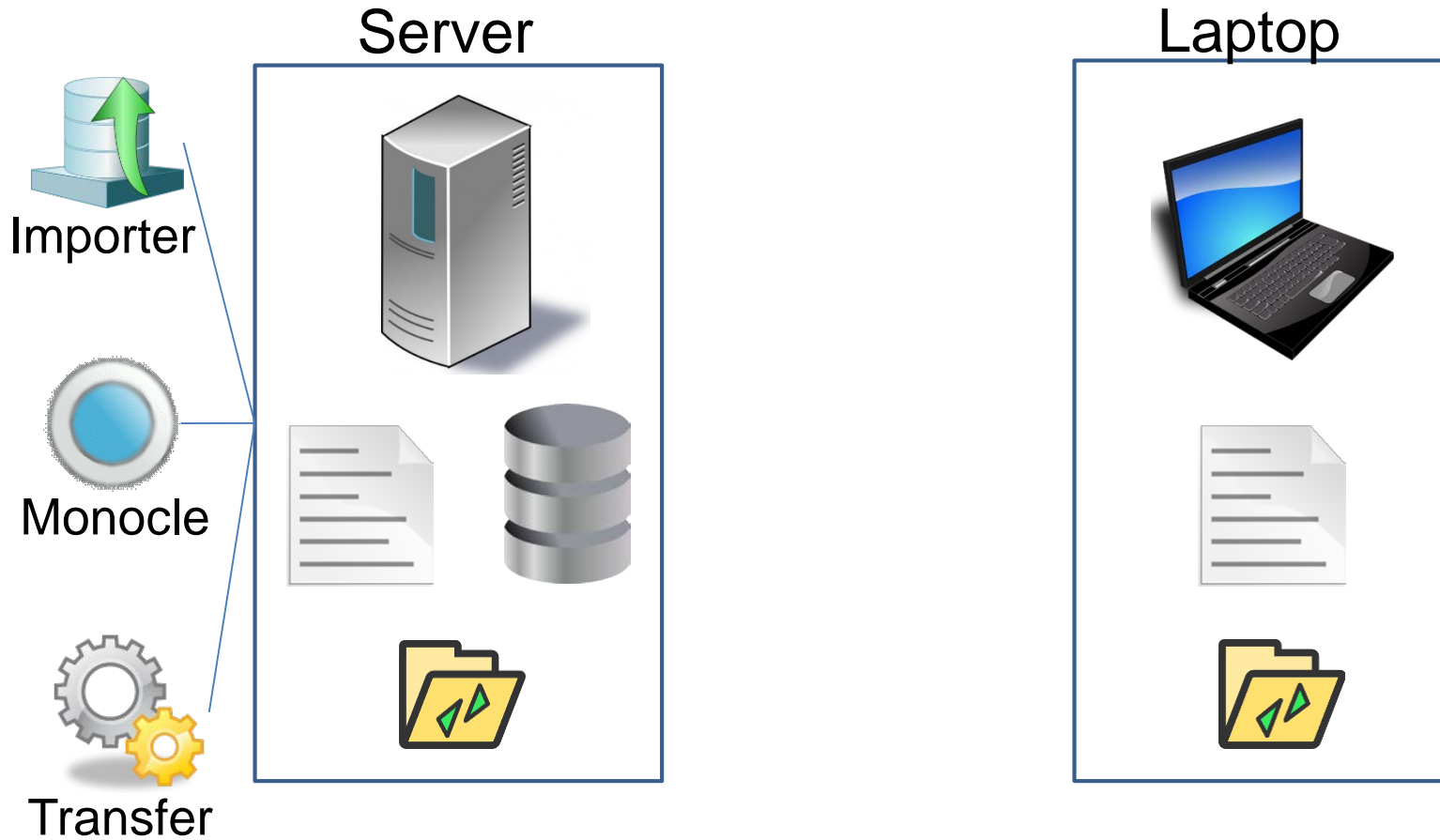




Transfer - MySQL Data Structure

- Transfer uses MySQL tables
 - Case ownership and assignment
 - Assignment is managed on the server
 - Ownership is managed on the laptop
 - Information about most recent server session and most recent laptop session

Laptop Prerequisites

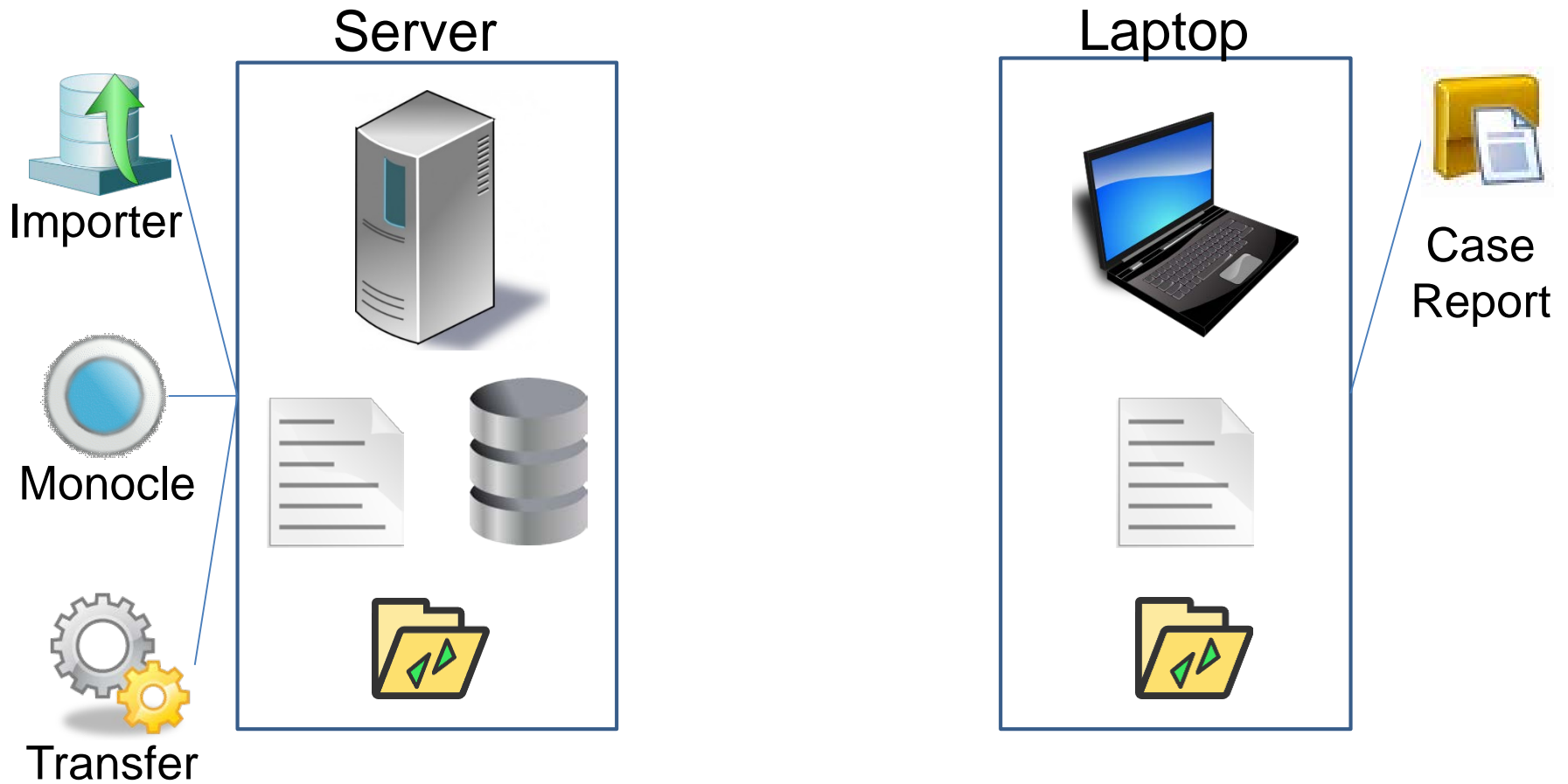




Prerequisites - Laptop

- Survey Instrument
 - CASES 5.5
- Synchronization folder
 - Used to upload/download files to server
- Laptop connects to MySQL server during synchronization

Case Report Application





Case Report Application

- Application to manage cases on laptops
 - Used by interviewers and supervisors
- No internet connection required
 - Reads survey data on laptop
 - Uses CASES program OUTPUT
- Displays data for cases on laptop
 - Variable list customizable via configuration file
 - Outcome code
 - Respondent name, address, and telephone
 - Date and time of appointment
 - Appointment calendar

Case Report with Practice Cases



C:\projects\p0000_CLIENT\PROD\e-inst

Case View Options Calendar

CASEID	CODE	First Name	Last Name	Area	Prefux	Suffix	Appointment	Locked
90001	0801	Harry	Potter	608	111	1111		<input type="checkbox"/>
90002	0821	Harry	Potter	608	111	1111	5/12/2015 ...	<input type="checkbox"/>
90003								<input type="checkbox"/>
90004								<input type="checkbox"/>
90005								<input type="checkbox"/>
90006								<input type="checkbox"/>
90007								<input type="checkbox"/>
90008								<input type="checkbox"/>
90009								<input type="checkbox"/>
90010								<input type="checkbox"/>

Case Report – Appointment Calendar



C:\projects\p0000_CLIENT\PROD\e-inst

Case View Options Calendar

CASEID	CODE	First Name	Last Name	Area	Prefux	Suffix	Appointment
90001	01	Harry	Potter	608	111	1111	
90002	21	Harry	Potter	608	111	1111	5/12/2015 ...
90003							
90004							
90005							
90006							
90007							
90008							
90009							
90010							

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	5/11/2015	5/12/2015 90002	5/13/2015	5/14/2015	5/15/2015	5/16/2015
5/17/2015	5/18/2015	5/19/2015	5/20/2015	5/21/2015	5/22/2015	5/23/2015
5/24/2015	5/25/2015	5/26/2015	5/27/2015	5/28/2015	5/29/2015	5/30/2015
5/31/2015	6/1/2015	6/2/2015	6/3/2015	6/4/2015	6/5/2015	6/6/2015
6/7/2015	6/8/2015	6/9/2015	6/10/2015			

Case Report – Case Summary



- Portal for opening case in survey instrument
- Selecting a case displays a history of case activity
 - Session date and time
 - Interviewer comments
- User entry-point for survey instrument
 - View summary before opening case
 - Confirm the caseid and respondent name
 - Reduce the likelihood of opening wrong case

Case Report – Confirm First Name



The screenshot shows a software application window titled "Caseid 90001" with a menu bar containing "Case", "View", "Options", and "Calendar". Below the menu is a table with the following data:

CASEID	CODE	First Name	Last Name	Area	Prefux	Suffix	Appointment
90001	01	Harry	Potter	608	111	1111	
90002	21	Harry	Potter	608	111	1111	5/12/2015 ...

A "Case" dialog box is open, displaying the following information:

Caseid: 90001
First Name: Harry
Last Name: Potter
CODE: 0801
Area: 608
Prefux: 111
Suffix: 1111

5/11/2015 8:53:40 AM
no answer, left materials at door bbd//

A "CaseReport" dialog box is overlaid on the "Case" dialog, containing the following text:

Please enter the value of the item 'First Name' to confirm that this is the correct caseid.

Buttons: OK, Cancel

Text input field: Harry

Case Report – Configuration



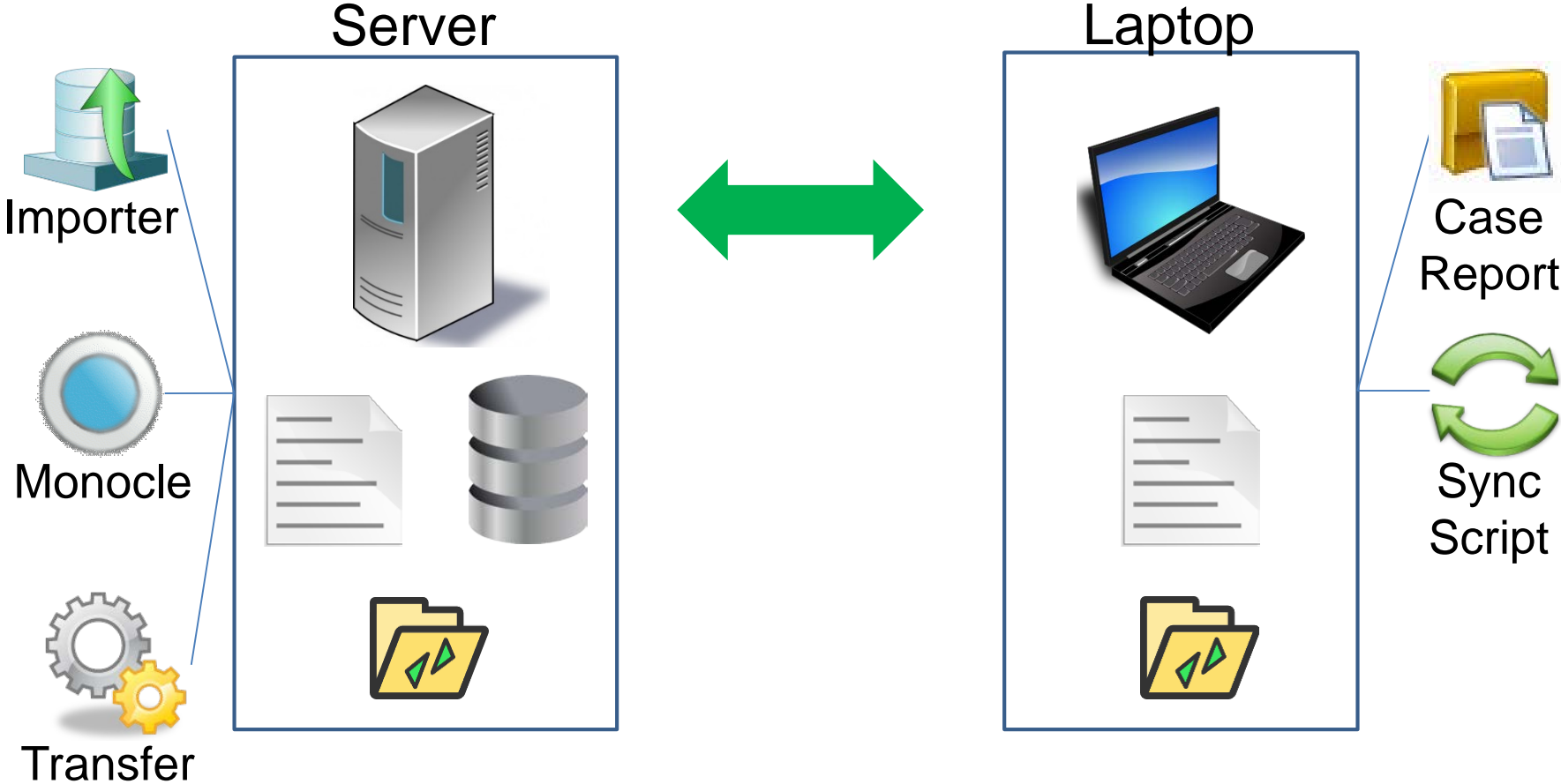
- Configuration file contains study-specific settings
 - Path to survey on laptop
 - Variable definitions
 - Item name in survey instrument
 - Variable label
 - Value labels for numeric data
 - Default font name and size



Case Report – User Configuration

- User-specific settings contained in separate file
 - Column sequence
 - Users may drag and drop columns
 - Preferred font name and size
 - Filters to display or conceal cases
 - Held cases
 - Cases reassigned to other interviewers
 - Non-entry cases
 - Completed interviews
 - Other final outcomes

Synchronization Script



Synchronization Script



- Batch file on laptops
- Synchronizes files between laptop and server
- Run on demand by the interviewer
 - Daily, or at request of supervisor
- Requires VPN connection to server
- Uses rsync program to copy files

rsync Program



- Third-party application
- Synchronizes contents of a folder on the server with its corresponding folder on the laptop
 - Transfer files containing survey data
 - Latest version of instrument from server
 - Audio files
 - Images
- Only copies files which have been modified
 - Compares server and laptop directories
 - File size and timestamp

Synchronization Script – Sequence



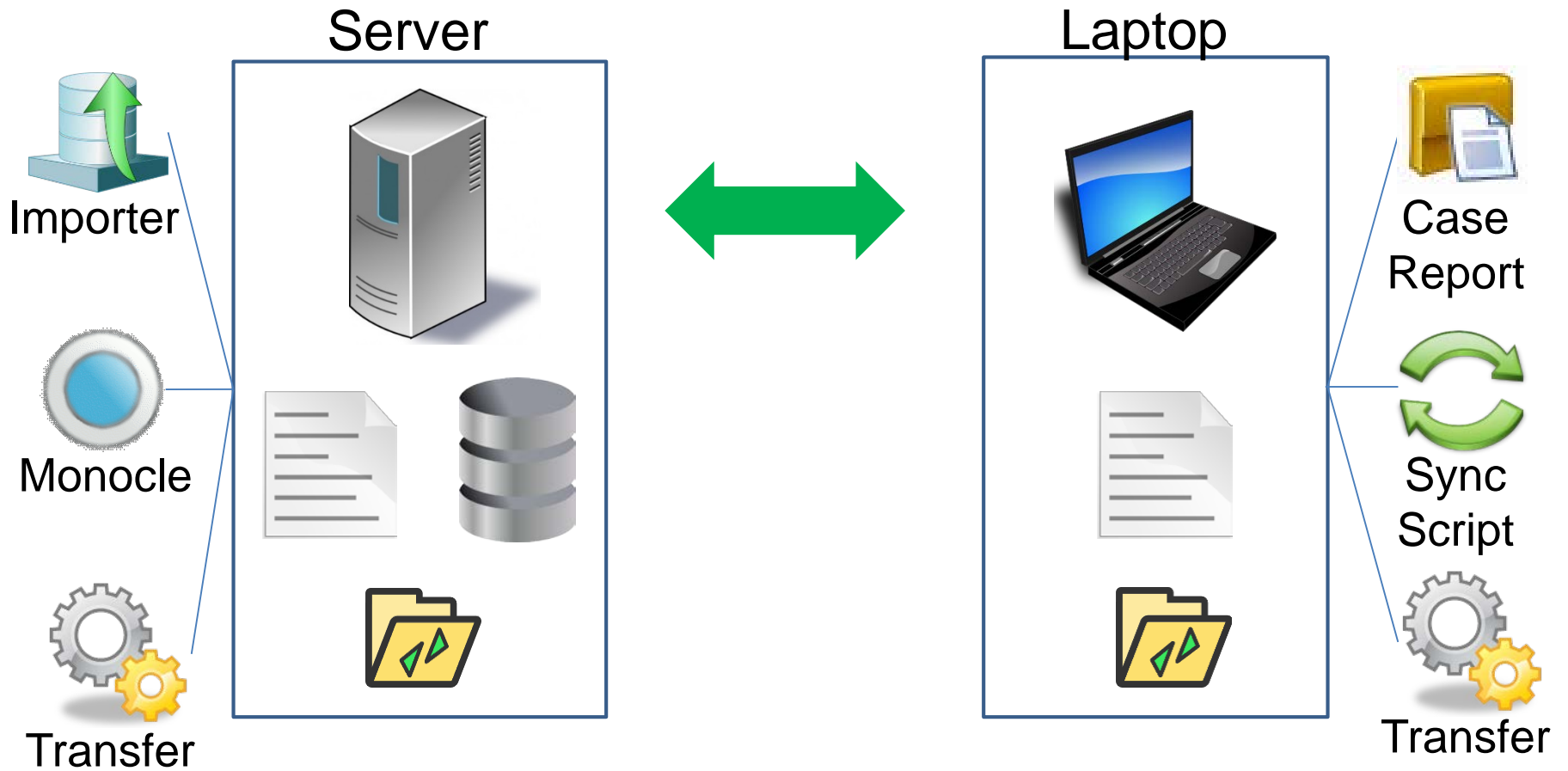
- Download from Server
 - Run rsync program
 - Download transfer files from server
 - Run Preflight batch file
 - Copy survey instrument to laptop
 - Initial deployment
 - Updates while in field
 - Copy shortcuts to desktop
 - Copy applications and configuration files to laptop
 - Run Transfer Application
 - Reload transfer files downloaded from server
 - Create transfer files to upload to server

Synchronization Script – Sequence



- Upload to Server
 - Run rsync program
 - Upload transfer files to server
 - Upload pictures and audio files
 - Run Postflight batch file

Transfer - Laptop





Transfer – Laptop

- Invoked by the synchronization script
- Manages files containing survey data
 - Processes the files copied by rsync
- Creates and reloads files containing archived data from surveys
 - Uses CASES program MOVECASE to create files, exporting data from the survey instrument
 - Uses CASES program RELOAD to reload files, importing data into the survey instrument



Transfer – Case Assignment and Ownership

- Assignment
 - ID of user to whom case is assigned
 - Supervisors assign cases on server
- Ownership
 - ID of user who currently owns case
 - Transfer program manages ownership on laptops
 - Relinquish ownership of cases no longer assigned to user after uploading data
 - Take ownership of cases assigned to user if those cases are not owned by other users

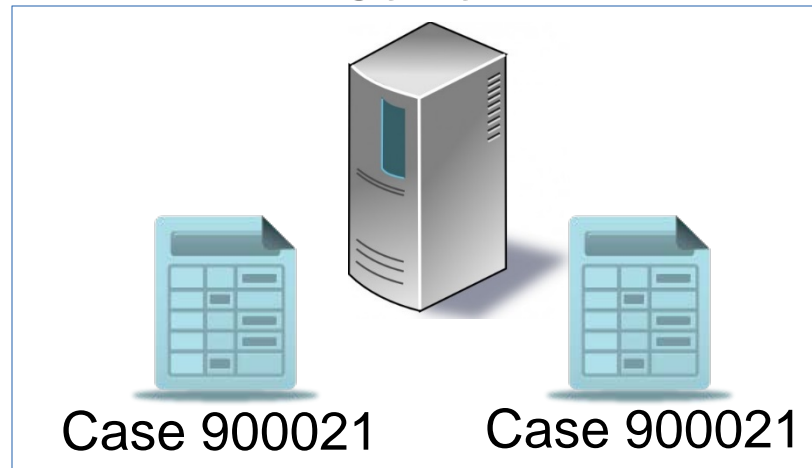


Transfer – Case Ownership

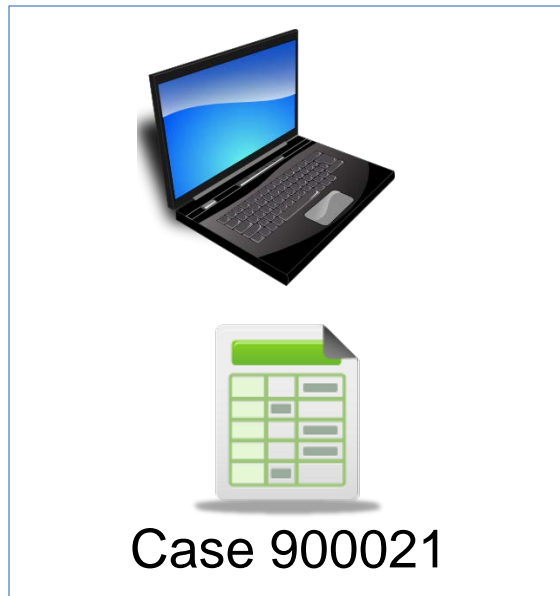
- Strict case ownership model
 - Prevents conflicts when a case is reassigned
 - Original owner must synchronize to relinquish ownership of the case before newly assigned interviewer can assume ownership
 - Only one interviewer can access a case



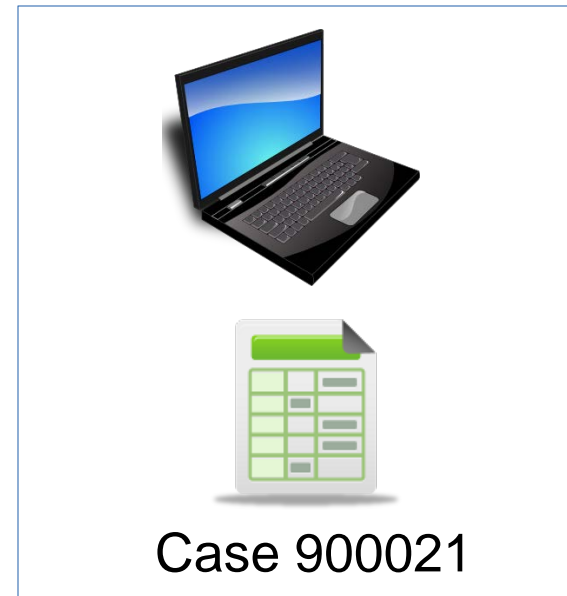
Server



Interviewer 1



Interviewer 2





Transfer – Setting and Clearing Holds

- Transfer program puts cases on hold when they are no longer owned by interviewer
 - Uses CASES program MANAGER to set and clear holds
 - Cases on hold concealed by Case Report
 - Cases on laptop are never deleted
 - Cases held if no longer owned by interviewer



Transfer Logs

- Date and outcome of transfer sessions
 - Text files on laptop and server
 - MySQL tables on server

autoid	user_id	transfer_started	transfer_finished	transfer_outcome
1	1	2015-05-11 08:50:28	2015-05-11 08:50:41	5/11/2015 8:50:28 AM transfer duration 0 minute(s) 12 second(s); 10 taken; 10 imported; 10 reloaded
2	1	2015-05-11 08:56:41	2015-05-11 08:56:50	5/11/2015 8:56:41 AM transfer duration 0 minute(s) 8 second(s); 2 exported; 2 created
3	1	2015-05-11 09:05:13	2015-05-11 09:05:21	5/11/2015 9:05:13 AM transfer duration 0 minute(s) 8 second(s)

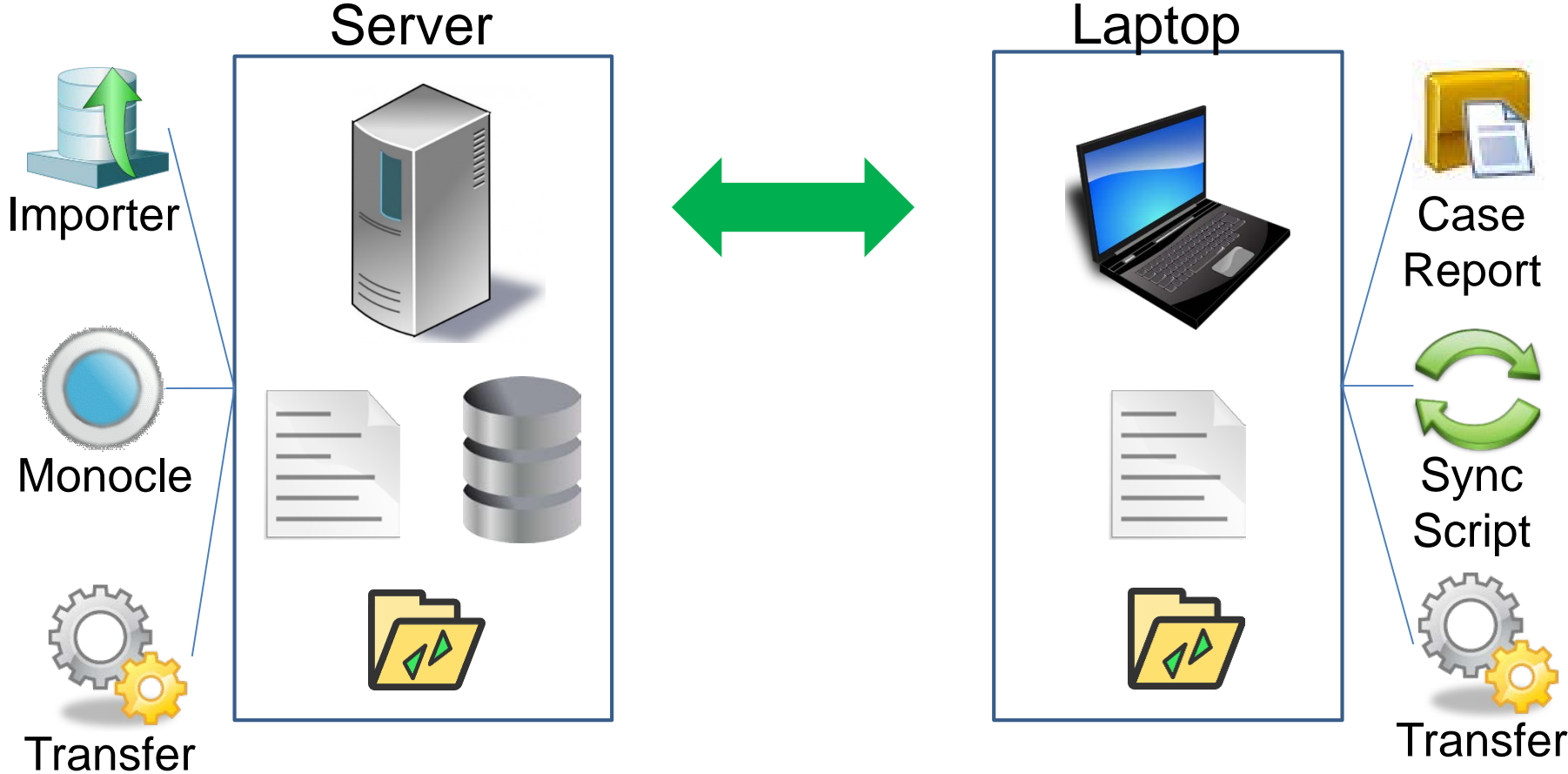


Transfer Logs

- Transfer activity for individual cases
 - MySQL tables on server

autoid	csid	user_id	event_date	event_text	event_error
1173	90001	1	2015-05-11 08:56:45	transfer file 90001_1.1 created	0
1174	90002	1	2015-05-11 08:56:45	transfer file 90002_1.1 created	0
1175	90001	1	2015-05-11 08:56:46	exporting 90001_1.1	0
1176	90002	1	2015-05-11 08:56:47	exporting 90002_1.1	0
1177	90001	99	2015-05-11 08:58:59	importing 90001_1.1	0
1178	90002	99	2015-05-11 08:58:59	importing 90002_1.1	0
1179	90001	99	2015-05-11 08:59:09	transfer file 90001_1.1 reloaded on server	0
1180	90002	99	2015-05-11 08:59:09	transfer file 90002_1.1 reloaded on server	0

System Summary



Tool Summary

- Server
 - Survey instrument
 - MySQL database
 - Importer
 - Import Monitor
 - Monocle
 - Transfer program
 - Synchronization folder
- Laptop
 - Survey instrument
 - Case Report
 - Transfer program
 - Synchronization folder
 - Synchronization script
 - rsync program

System Features

- Customizable
- Scales well
 - Server load
- Case-level granular management capability
- Meta-data on processes
 - Aid with support and debugging
- Fault tolerant
 - Transfer files function as archives to reload data
 - rsync tolerates interruptions
 - Data are not deleted from laptops

Questions?

Acknowledgements

- Steve Bochte
- Kate Golen
- Augie Salick
- Drew Vogel

Thank you!

For copies of this presentation or more information, please contact us at bday@ssc.wisc.edu, cschlapper@ssc.wisc.edu, or ewhite@ssc.wisc.edu

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