

## CNS Audit Version 1.5

# Setup Guide

## **Table of Contents**

Preparing the database for CNS Audit	4
Creating the CNS Audit Tables	4
Removing Layout Name / Table Occurrence Name conflicts	4
Set up the database for tracking field changes	6
Set up the database for tracking record deletions	11
Set up the database for startup and shutdown	15
Auditing existing data	21
Solution 1	21
Solution 2	24
Set up is complete	26
Optional set up tasks	27
Protecting Audit Trail Data	27
Auditing Actions other than Modifying Data	27
Auditing Record Views	28
Preventing database modification if CNS Audit is not present	t <b>31</b>
Setting up Multiple Files / Data Separation Model	34
Make sure all files have a reference to the CNS Audit tables	34
Modify the CNS Audit Trigger fields	34
Modify the Startup scripts	37

Modify any CNSAudit_AccessLog calls	38
Additional Information	39
Modifying schema	39

## Preparing the database for CNS Audit

All of the example screenshots and text in this guide were taken from the CNS Audit Example database included with the plug-in. So, if you want to see a live example of the steps taken in this guide, feel free to explore that database as you follow along.

#### **Creating the CNS Audit Tables**

Before CNS Audit can start tracking changes to your database, a few tables need to be created. CNS Audit can do this for you from the CNS Audit Configuration Dialog. Open your database in FileMaker Pro and make sure you log in with an account that has [Full Access] privileges. Next, open the CNS Audit Configuration Dialog on Mac by choosing Preferences from the FileMaker Pro menu, switch to the Plug-Ins tab, then double-click on CNS Audit. On Windows, choose Preferences from the Edit menu, switch to the Plug-Ins tab, and double-click on CNS Audit. In the CNS Audit Configuration Dialog, switch to the Basics tab and press the Create Audit Tables button. A dialog should come up telling you that the tables were created.

#### **Removing Layout Name / Table Occurrence Name conflicts**

If your database will be used with any version of FileMaker Pro prior to version 11, regardless of the version of FileMaker Pro you develop with, you will need to prepare it for use with CNS Audit under those versions. In Order for CNS Audit to work properly with versions of FileMaker Pro prior to version 11, there cannot be any Table Occurrences with the same name as Layouts in the database. CNS Audit is capable of keeping track of the fields in the database even if their names are changed, but to do this in versions of FileMaker Pro prior to version 11, it needs to use the FieldIDs calculation function. This function allows for retrieving the Field IDs of all the fields in a specific Table Occurrence, so long as there is not a Layout with the same name as the Table Occurrence. If there is a Layout with the same name as the Table Occurrence. Since all the fields in the Table Occurrence may not be on the Layout, this causes CNS Audit to not see, and therefore not Audit, all the fields in the Table Occurrence.

Unfortunately, when creating a table, FileMaker Pro automatically creates a Layout with the same name as the table. To prepare your database for use with CNS Audit under versions of FileMaker Pro prior to version 11, these duplicate names must be changed. Either rename the Table Occurrence or rename the Layouts. It is probably easier to rename the Layouts because when renaming a Table Occurrence, if the automatically generated Layout has never been manually renamed, FileMaker Pro updates the automatically generated Layout to have the same name as the Table Occurrence. Consider renaming the Layout by adding the word "Entry" to the end. For example, if a Table Occurrence is named Contacts, the associated Layout would be named Contacts Entry. However, this is only a suggestion.

CNS Audit makes it easy to determine which Layouts have the same name as Table Occurrences in your database. Open your database in FileMaker Pro and make sure you log in with an account that has [Full Access] privileges. Next, open the CNS Audit Configuration Dialog. (See the *Creating the CNS Audit Tables* section above for instructions on how to open the CNS Audit Configuration Dialog.) In the CNS Audit Configuration Dialog, switch to the Basics tab and press the Check for Layout Conflicts button. (Note: This button is not visible when running under FileMaker Pro 11 or above.) If there are any Layouts that have the same name as any Table Occurrences, the plug-in will present you with a list of those Layouts. After renaming those layouts, you can use the Check for Layout Conflicts button again to ensure all the conflicts have been resolved.

## Set up the database for tracking field changes

This section explains the steps necessary to set up each Table in the database for auditing. After completing these steps, the plug-in will be able to track the changes to field values in the database. (Note: You may also want to implement the validation options described in the *Preventing database modification if CNS Audit is not present* subsection of the *Additional Information* section at this time.) If your solution consists of multiple files, you will also need to follow the instructions in the *Setting up Multiple Files / Data Separation Model* section.

- 1. Open the Database file and go to Define / Manage Database.
- 2. Switch to the Fields tab and select the first table from the Table drop-down menu in which auditing needs to be added.

		010.0
	Tables Fields Relationships	Step
Table: Contacts	l0 fields View by: creation order	
Field Name	Type Options / Comments (Click to toggle)	
≠ Serial#	Number Auto-enter Serial	
ContactID	Text Auto-enter Calculation	
FirstName	Text	
‡ LastName	Text	
Company	Text	Stop
Address	Text	, Sieh
≠ City	Text	
<b>↓</b> State	Text	
+ Zip	Number	
<ul> <li>CNS Audit Timestamp</li> </ul>	Timestamp Modification Timestamp (Date and Time)	
		Step
Field Nam : CNS Audit Time	tamp Type: Timestamp 🗘 Options	
Comments		
Comment:		
Create	Change Duplicate Delete Copy Paste	
Deint	Cancel OK	

- 3. Add a new Timestamp field named CNS Audit Timestamp.<sup>1</sup>
- 4. Press Options for the CNS Audit Timestamp field.

<sup>&</sup>lt;sup>1</sup> Make sure the field is named CNS Audit Timestamp exactly.

5. In the Options for Field dialog that pops-up, switch to the Auto-Enter tab, and check the Modification Timestamp option.

Options for Field "CNS Audit Timestamp" Auto-Enter Validation Storage Furigana	
Automatically enter the following data into this field:	Step 5.
Creation Timestamp (Date and Time)	
Modification Timestamp (Date and Time)	
Serial number	
Generate: <ul> <li>On creation</li> <li>On commit</li> </ul>	
next value 1 increment by 1	
Value from last visited record	
Data:	
Calculated value Specify	
✓ Do not replace existing value of field (if any)	
Looked-up value Specify	
Prohibit modification of value during data entry	Step 7.
Cancel	

- 6. *Optional*: Set up the Validation options as described in the *Preventing database modification if CNS Audit is not present* subsection of the *Additional Information* section.
- 7. Press OK to close the Options for Field dialog.
- 8. Add a new Text field named CNS Audit Trigger.<sup>2</sup>

<sup>&</sup>lt;sup>2</sup> Make sure the field is named CNS Audit Trigger exactly.

Ma	inage Database for "CNS Audit Example"	
	Tables Fields Relationships	
Table: Contacts	11 fields View by: creation order	<u>.</u>
Field Name	Type Options / Comments (Click to toggle)	Step
	Number Auto-enter Serial	
ContactID	Text Auto-enter Calculation	
+ FirstName	Text	
+ LastName	Text //	
+ Company	Text	
	Text	
+ City	Text	
<b>≠</b> State	Text	
+ Zip	Number	
+ CNS Audit Timestamp	Timestamp Modification Timestamp (Date and Time)	
<ul> <li>CNS Audit Trigger</li> </ul>	Text Auto-enter Calculation replaces existing value	
		Step
Field Name: CNS Audit Trigger	Type: Text Options	
Comment:		
Create	hange Duplicate Delete Copy Paste	
Print	Cancel OK	

9. Press Options for the CNS Audit Trigger field.

10. In the Options for Field dialog that pops-up, switch to the Auto-Enter tab, and check the Calculated Value option.

Options for Field "CNS Audit Trigger"	
Auto-Enter Validation Storage Furigana	
Automatically enter the following data into this field:	
Creation Date	
Modification Date	
Serial number	
Generate: <ul> <li>On creation</li> <li>On commit</li> </ul>	
next value 1 increment by 1	
Value from last visited record	Step 10.
Data:	
Calculated value Specify	Step 14.
Do not replace existing value of field (if any)	
Looked-up value     Specify	
Prohibit modification of value during data entry	Step 15.
Cancel	

11. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.



- 12. In the list of functions, scroll down until a line for CNSAudit\_RecordChange is visible and double-click it.
- 13. Press OK to close the Specify Calculation dialog.
- 14. Back on the Options for Field dialog, uncheck the Do not replace existing value of field (if any) option.
- 15. Press OK to close the Options for Field dialog.
- 16. Repeat steps 3-15 for each table that needs auditing. (If using FileMaker Pro Advanced, highlight the two fields, press Copy, and then go to each table and press Paste.)
- 17. Close the Define / Manage Database dialog.

## Set up the database for tracking record deletions

This section explains the steps necessary to set up each Privilege Set for tracking record deletions.

Note: The Record Privileges for the [Full Access] Privilege Set cannot be modified, therefore any user logging in with the [Full Access] Privilege Set will be able to view and delete records without being audited. The best practices for security in FileMaker Pro say to not have anyone logging in with the [Full Access] Privilege Set anyway, so you should consider creating a new Privilege Set with the options defined below and then apply it to your users that are currently assigned the [Full Access] Privilege Set.

- 1. Open up the Accounts & Privileges / Manage Security dialog.
- 2. Switch to the Privilege Sets tab and edit the first custom privilege set. If there are no custom privilege sets, highlight the [Data Entry Only] privilege set, press Duplicate, and then edit that new privilege set.



3. In the Data Access and Design section, press the Records drop-down menu and select Custom Privileges.

Normal User         Data Access and Design       Other Printeges         Records:       Custom privileges         Layouts:       All view only         Value Lists:       All view only         Scripts:       All executable only         Disconnect user from FileMaker Server when idle	
Data Access and Design       Other Printing         Records:       Custom privileges         Layouts:       All view only         Value Lists:       All view only         Scripts:       All executable only	-
Records:       Custom privileges         Layouts:       All view only         Value Lists:       All view only         Scripts:       All executable only         Allow user to override data validation warnings         Value Lists:       All executable only	
Layouts:       All view only       Image: All wiew only         Value Lists:       All view only       Image: All wiew only         Scripts:       All executable only       Image: All wiew only         Image: Scripts:       All executable only       Image: Script Scrip	
Value Lists:       All view only       Manage extended privileges         Scripts:       All executable only       Allow user to override data validation warnings         Image: Scripts:       Image: Scripts and Sc	
Scripts: All executable only	
V Disconnect user from FileMaker Server when idle	
Extended Privileges	
Access via Instant Web Publishing (fmiwp)	
Access via ODBC/JDBC (fmxdbc)	
Access via FileMaker Network (fmapp) Access via FileMaker Mobile (fmmobile) Minimum password length: 5 character	s
Access via XML Web Publishing - FMS only (fm     Access via XSLT Web Publishing - FMS only (fm     Available menu commands: All	

- $\ \ \, \text{A. In the Custom Record Privileges dialog that pops up, select the first table. }$
- 5. Press the Delete drop-down menu and select limited....

		Custom Rec	ord Privileges			
Table Name	View	Edit	Create	Delete	Field Access	
Contacts	limited	limited	yes	limited	all	
Phones	limited	limited	yes	limited	all	
Globals	yes	yes	yes	yes	all	📊 Step 4.
CNS Audit Log	yes	-	yes	-	all	
CNS Access Log	yes	yes	yes	yes	all	
CNS Audit Prefs	yes	yes	yes	yes	all	
[Any New Table]	yes	yes	yes	yes	all	
						Step 5
Set Privileges:	View	Edit	Create	Delete	Field Access	
-	limit 🗘	limit 🗘	yes	limit	all 🛊	
Select All					Cancel OK	

6. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.



- 7. In the list of functions, scroll down until a line for CNSAudit\_RecordDelete is visible and double-click it.
- 8. Determine if your database will only be used by client versions of FileMaker Pro 11 or above:
  - a. If so, replace the TableName parameter with the Base Table Name of the table you are editing the privileges of.
  - b. If not, specify any Table Occurrence Name of the table you are editing the privileges of. (At the top of the Specify Calculation dialog is the Evaluate this calculation from the context of setting. You can use the same Table Occurrence name in your calculation as is selected in that setting.)
- 9. Press OK to close the Specify Calculation dialog.
- 10. Repeat steps 5-9 for each table in the Custom Record Privileges dialog. (Once the CNSAudit\_RecordDelete function has been added to one calculation, copy and paste it to the other ones, or just retype it, and skip selecting the External Functions repeatedly. Make sure you update the TableName parameter for each table, though.)
- 11. Press OK to close the Custom Record Privileges dialog.
- 12. Press OK to close the Edit Privilege Set dialog.
- 13. Repeat steps 3-12 for each custom privilege that needs modifying.
- 14. Switch to the Accounts tab and reassign Privilege Sets to the Accounts as necessary.
- 15. Press OK to close the Accounts & Privileges / Manage Security dialog.

Once these Custom Record Privileges are set up, the plug-in will be able to track record deletions which are stored in the CNS Audit Log table. The CNSAudit\_RecordDelete function will also cause the record to be audited before it is deleted if it has never been audited before. The audit actually occurs whether the user actually deletes the record or if he or she presses Cancel on the record deletion confirmation dialog.

## Set up the database for startup and shutdown

This section explains how to add or modify the Startup and Shutdown scripts for the database for setting up CNS Audit for the file. While this is optional for single-file solutions, by following these instructions, CNS Audit will function better with the database. If your solution consists of multiple files, you will be required to add at least a Startup script and follow the instructions in the *Setting up Multiple Files / Data Separation Model* section below.

- 1. Open up the ScriptMaker / Manage Scripts dialog.
- 2. Create a script named Startup (or something similar) or edit an existing Startup script if one is already in use.
- 3. Add a Set Variable script step and double-click it.<sup>3</sup>
- 4. In the Set Variable Options dialog that pops up, name the variable \$CNSAudit or something similar.

	"Set Variable" Options		
Names prefixed current script. I throughout the	d by "\$" are local variables available onl Prefix the name with "\$\$" to make the v current file (global).	y within the ariable available	Step 4.
Name:	\$CNSAudit		Step 5.
Value:		Specify	
Repetition:	1	Specify	
	Cancel	ОК	

- 5. Press Specify... next to the Value field.
- 6. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.

<sup>&</sup>lt;sup>3</sup> If using FileMaker Pro 7, use a Set Field script step and set a field in the database with the same calculation as the Value calculation for the Set Variable script step.



- 7. In the list of functions, scroll down until a line for CNSAudit\_StartupFile is visible and double-click it.
- 8. For now, select everything in curly brackets after CNSAudit\_StartupFile and delete it.<sup>4</sup>
- 9. Press OK to close the Specify Calculation dialog.
- 10. Press OK to close the Set Variable Options dialog.
- 11. Save and close the Startup script window.
- 12. Create a script named Shutdown (or something similar) or edit an existing shutdown script if one is already in use.
- 13. Add a Set Variable script step and double-click it.5

<sup>&</sup>lt;sup>4</sup> If your solution contains multiple files, see the *Setting up Multiple Files / Data Separation Model* section for an explanation of the optional parameter for the CNSAudit\_StartupFile function.

<sup>&</sup>lt;sup>5</sup> If using FileMaker Pro 7, use a Set Field script step and set a field in the database with the same calculation as the Value calculation for the Set Variable script step.

14. In the Set Variable Options dialog that pops up, name the variable \$CNSAudit or something similar.

	"Set Variable" Options			
Names prefixed current script. I throughout the	Names prefixed by "\$" are local variables available only within the current script. Prefix the name with "\$\$" to make the variable available throughout the current file (global).			
Name:	\$CNSAudit	Step 15.		
Value:	Specify	/		
Repetition:	1 Specify	Step 20.		
	Cancel			

- 15. Press Specify... next to the Value field.
- 16. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.

This calculation will be evalu	ated based on context deter	nined at runtime.	Step 16.
Contacts	Operators	View: External functions	
Serial# ContactID FirstName LastName Company Address City State Zip CNSAudit_ShutdownFile /*AllowCancel = If False progress dialog, this di	& / m * 1 - 0 + sables the Cancel button	CNSAudit_RecordDelete(TableN CNSAudit_RecordOpen(TableNa CNSAudit_RecordView(TableNa CNSAudit_Register(FirstName; L CNSAudit_Register(FirstName; L CNSAudit_RollBack(AuditID)/*A CNSAudit_SetupFile CNSAudit_StartupFile{(AllowC CNSAudit_StartupFile{(OtherFile CNSAudit_SuspendFile(TrueOrFa CNSAudit_SuspendFile(TrueOrFa CNSAudit_SuspendFile(TrueOrFa	Step 17. Step 18.
Calculation result must be T	ext		Sten 19
earn More		Cancel	0.ep 19.

17. In the list of functions, scroll down until a line for CNSAudit\_ShutdownFile is visible and double-click it.

- 18. For now, select everything in curly brackets after CNSAudit\_ShutdownFile and delete it.<sup>6</sup>
- 19. Press OK to close the Specify Calculation dialog.
- 20. Press OK to close the Set Variable Options dialog.
- 21. Save and close the Shutdown script window.
- 22. Close the ScriptMaker / Manage Scripts dialog.
- 23. Open the File Options dialog and switch to the Open/Close tab.
- 24. In the When opening this file section, check the Perform script option.

File Option	is for "CNS	Audit Ex	ample"	
Open/Close	Spelling	Text	Graphics	
When opening this file				_
🗹 Log in using:	O Guest A	ccount		
	Account	Name a	nd Password	
Account:	Test			
Password:				Step 24
Switch to layout:	Contacts	Entry	A V	
Perform script:	Specify	) "Start	up"	
When closing this file –				Step 27
Perform script:	Specify	) "Shut	down"	
	_	(	Cancel 0	K

<sup>&</sup>lt;sup>6</sup> See the online CNS Audit Function Reference for an explanation of the optional parameter for the CNSAudit\_ShutdownFile function.

25. In the Specify Script dialog that pops up, select the Startup script created/ edited in step 2.

Select a script to perform.	
Show All	Step 25.
🕞 Startup	
콜 Shutdown	
🖅 Log in as Admin	
🔄 Log in as Test	
Setup Auditing Preferences	
	Step 26.
Cancel OK	

- 26. Press OK to close the Specify Script dialog.
- 27. Back on the File Options dialog, in the When closing this file section, check the Perform script option.

28. In the Specify Script dialog that pops up, select the Shutdown script created/ edited in step 12.

Specify Script	
Select a script to perform.	
	Step 28.
Shutdown	
Log in as Admin Log in as Test	
Setup Auditing Preferences	
	Step 29.
Cancel OK	

29. Press OK to close the Specify Script dialog.

30. Press OK to close the File Options dialog.

## Auditing existing data

CNS Audit is normally invoked when a record is committed and at that point it compares the data in the committed record with the Audit Trail data in the CNS Audit Log database. When adding CNS Audit to an existing database with existing data (as opposed to a new database), the CNS Audit Log will not contain any Audit Trail data for the database at the point CNS Audit is implemented. If there is no previous entries for any given record in the CNS Audit Log when a record is audited, CNS Audit will create new entries for the record, but any values in the record prior to the audit will be lost. CNS Audit offers two solutions for this situation:

## Solution 1

CNS Audit includes a function named CNSAudit\_RecordOpen. This function is similar to the CNSAudit\_RecordDelete function in that it's used in the Custom Record Privileges for each table in your database. By using this function with the Edit Custom Record Privilege, CNS Audit is able to capture the current state of the record before any edits are made. This function also logs an Open action to the CNS Access Log table. Follow these instructions to add the CNSAudit\_RecordOpen function.

- 1. Open up the Accounts & Privileges / Manage Security dialog.
- 2. Switch to the Privilege Sets tab and edit the first custom privilege set.

	Ma	inage Accounts	& Privileges		
	Accounts	Privilege Sets	Extended Privileges		
Use this panel to manage or more accounts.	privilege sets. Ea	ch privilege set co	ntains a set of permissions, which can be use	d by one	
Privilege Set	Activ	e accounts	Description	<u>à</u>	
	Adm	in	access to everything write access to all records, read access to all records.	no	
<ul> <li>Normal User</li> </ul>	Test				
				$\uparrow$	Step 2.
New Edit	Duplicate	Delete	View by: creation order	•	
			Cancel	ОК	

3. In the Data Access and Design section, press the Records drop-down menu and select Custom Privileges.

Privilege S	et Name	Description		Step 3
Normal Use	r			
Data Acce	ss and Design		Other Printeges	
Records:	Custom privileges	<b>•</b>	Allow printing	
Layouts:	All view only	•	Allow exporting	
Value Lists:	All view only	\$	Manage extended privileges	
Scripts:	All executable only	•	Allow user to override data validation warnings	
	Delutiones		🗹 Disconnect user from FileMaker Server when idle	
Extended	Privileges via Instant Web Publishi	na (fmiwn)	🗹 Allow user to modify their own password	
Access v	/ia ODBC/JDBC (fmxdbc	:)	Must be changed every 30 days	
Access v	via FileMaker Network (1 via FileMaker Mobile (fr	fmapp) 1mobile)	Minimum password length: 5 characters	
Access \	ia XML Web Publishing	- FMS only (fm	Available menu commands: All	

- $\ \ \, \text{A. In the Custom Record Privileges dialog that pops up, select the first table. }$
- 5. Press the Edit drop-down menu and select limited....

C			Custom Rec	ord Privileges			
	Table Name	View	Edit	Create	Delete	Field Access	
	Phones Globals CNS Audit Log CNS Access Log CNS Audit Prefs	limited yes yes yes yes	limited yes - yes yes	yes yes yes yes yes yes	limited yes - yes yes	all all all all all	Step 4.
	[Any New Table]	yes	yes	yes	yes	all	Step 5.
	Set Privileges:	View limit	Edit limit 🗘	create yes	Delete	Field Access	
	Select All					Cancel OK	

6. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.



- 7. In the list of functions, scroll down until a line for CNSAudit\_RecordOpen is visible and double-click it.
- 8. Determine if your database will only be used by client versions of FileMaker Pro 11 or above:
  - a. If so, replace the TableName parameter with the Base Table Name of the table you are editing the privileges of.
  - b. If not, specify any Table Occurrence Name of the table you are editing the privileges of. (At the top of the Specify Calculation dialog is the Evaluate this calculation from the context of setting. You can use the same Table Occurrence name in your calculation as is selected in that setting.)
- 9. Press OK to close the Specify Calculation dialog.
- 10. Repeat steps 5-9 for each table in the Custom Record Privileges dialog. (Once the CNSAudit\_RecordOpen function has been added to one calculation, copy and paste it to the other ones, or just retype it, and skip selecting the External Functions repeatedly. Make sure you update the TableName parameter for each table, though.)
- 11. Press OK to close the Custom Record Privileges dialog.
- 12. Press OK to close the Edit Privilege Set dialog.
- 13. Repeat steps 3-12 for each custom privilege that needs modifying.
- 14. Press OK to close the Accounts & Privileges / Manage Security dialog.

## Solution 2

CNS Audit includes a function named CNSAudit\_Init that can create an initial set of Audit Trail data. This function will look for every table in your database that contains the CNS Audit Trigger field (ie. tables that have been set up for auditing) and examine every record in those tables to determine if that record has been audited. If it has not, or if the record indicates there was some error the last time it was audited, then CNS Audit will create a set of initial records in the CNS Audit Log table to reflect the state of the record at that moment. After using CNSAudit\_Init the CNS Audit Log table will contain all necessary information for rolling back changes to the database up to the point that the CNSAudit\_Init function was used.

Some important information about this function: This function examines every single record in every single table that has been set up for auditing and will create a record in the CNS Audit Log table for every single field in each of those records. For any database that has a moderate to large number of records, the CNSAudit\_Init function can take hours to complete and will easily triple or quadruple the size of your database. While it's possible to run the CNSAudit\_Init function on a database that is hosted via FileMaker Server, the process will complete much faster if it's brought down from the server and run locally before being hosted again. Unless it's absolutely necessary that you have a full audit of every single record in your database (eg. to recreate the database from an empty clone), using the CNSAudit\_RecordOpen solution above to only track changes as they happen is probably a better choice.

Follow these steps to use the CNSAudit\_Init function:

- 1. Open up the ScriptMaker / Manage Scripts dialog.
- 2. Create a script named Init File or something similar.
- 3. Add a Set Variable script step and double-click it.7

<sup>&</sup>lt;sup>7</sup> If using FileMaker Pro 7, use a Set Field script step and set a field in the database with the same calculation as the Value calculation for the Set Variable script step.

4. In the Set Variable Options dialog that pops up, name the variable \$CNSAudit or something similar.

	"Set Variable" Options		
Names prefixed current script. I throughout the	l by "\$" are local variables available only Prefix the name with "\$\$" to make the va current file (global).	within the ariable availatie	Step 4.
Name:	\$CNSAudit		Step 5.
Value:		Specify	
Repetition:	1	Specify	Step 9.
	Cancel	ОК	

- 5. Press Specify... next to the Value field.
- 6. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.

This calculation will be evaluated ba	specity Calcula	at runtime.	Step 6.
Contacts	Operators	View: External functions	
Serial# ContactID FirstName LastName Company Address City State Zip CNSAudit_Init	&       /       =         #       #         ""       *         •       •	CNS Audit CNSAudit_AccessLog(Action {; N CNSAudit_Configure() Option {; P CNSAudit_Init CNSAudit_ListSiblingIDs(TableN CNSAudit_RecordChange(CNS A CNSAudit_RecordDelete(TableN CNSAudit_RecordOpen(TableNa CNSAudit_RecordOpen(TableNa CNSAudit_RecordOpen(TableNa	Step 7.
Calculation result must be Text			Step 8.
Learn More		Cancel OK	

- 7. In the list of functions, scroll down until a line for CNSAudit\_Init is visible and double-click it.
- 8. Press OK to close the Specify Calculation dialog.

- 9. Press OK to close the Set Variable Options dialog.
- 10. Save and close the Init File script window.

Run the Init File script to initialize the CNS Audit Log table with the data from the database. If the CNS Audit Log table has not yet been created, this function will create it and ask you to run the Init function a second time.

Notes:

- While running, the CNSAudit\_Init function shows a dialog with a progress bar and a Cancel button. The initialization process can be stopped at any time by pressing the Cancel button. The process can then be started again by running CNSAudit\_Init again and it will pick up where it left off.
- The CNSAudit\_Init function can be called at any time after CNS Audit has been implemented in a database and can be called multiple times if the need arises. For example, if for some reason CNS Audit was not installed on a computer that was using the database, any records added on that computer would not be audited. The CNSAudit\_Init function could be used to create Audit Trail data for those records added on the computer that did not have CNS Audit installed.

## Set up is complete

Your single-file database solution has now been set up for auditing via the CNS Audit Plug-in. Any edits to your data will now create Audit Trail records in the CNS Audit Log table. The remaining sections of this guide will show you how to make sure the plug-in is installed when your solution is open, how to add support for auditing Record Views, and how to set up multi-file / data separation model solutions to be audited.

## **Optional set up tasks**

### **Protecting Audit Trail Data**

While CNS Audit is in charge of creating an Audit Trail of the database, keeping everyday users from directly modifying that Audit Trail data after-the-fact is up to the database developer. To ensure that everyday users can add to, but not modify, the Audit Trail data, modify the CNS Audit Log entry in the Custom Record Privileges for the everyday users' Privilege Set as follows:

View:	yes
Edit:	no
Create:	yes
Delete:	no
Field Access:	all

$\bigcirc \bigcirc$		Custom Rec	ord Privileges		
Table Name	View	Edit	Create	Delete	Field Access
Contacts	limited	limited	yes	limited	all
Phones	limited	limited	yes	limited	all
Globals	yes	yes	yes	yes	all
CNS Audit Log	yes	-	yes	-	all
CNS Access Log	yes	yes	yes	yes	all
CNS Audit Prefs	yes	yes	yes	yes	all
[Any New Table]	yes	yes	yes	yes	all
Sat Privilagor	View	Edit	Create	Delete	Field Access
Set Fivilege	yes 🛟	no	yes 🛟	no	all
Select All					Cancel OK

## Auditing Actions other than Modifying Data

CNS Audit provides a CNSAudit\_AccessLog function for auditing any custom actions performed by database users. This function has one required parameter and one optional parameter. The first parameter is the Action to log, for example User Login. The second parameter is any special Notes about the action, for example User is logged in after hours. This information is stored in a separate table in the database named CNS Access Log.

#### **Auditing Record Views**

In the same way that the plug-in offers functions for tracking records being opened and deleted, CNS Audit includes a function for tracking record views. The CNSAudit\_RecordView function is used within the Custom Record Privileges just like the CNSAudit\_RecordOpen and CNSAudit\_RecordDelete functions:

- 1. Open up the Accounts & Privileges / Manage Security dialog.
- 2. Switch to the Privilege Sets tab and edit the first custom privilege set.

	Accounts Privilege Sets	Extended Privileges		
Use this panel to manage pr	rivilege sets. Each privilege set cont	ains a set of permissions, which can be	e used by one	
Privilege Set	Active accounts	Description	L L	
[Full Access]	Admin	access to everything		
<ul> <li>[Data Entry Only]</li> </ul>		write access to all reco	rds, no	
IRead-Only Access	Test	read access to all recor	rds no	
<ul> <li>Normai User</li> </ul>	Test			
				Ste
New) Edit	Duplicate Delete	View by: creation order		Ste

3. In the Data Access and Design section, press the Records drop-down menu and select Custom Privileges.

Privilege Set Name Description	St	tep
Normal User		•
Data Access and Design	Other Printages	
Records: Custom privileges 🛟	Allow printing	
Layouts: All view only	Allow exporting	
/alue Lists: All view only	Manage extended privileges	
Scripts: All executable only	Allow user to override data validation warnings	
	Sisconnect user from FileMaker Server when idle	
Access via Instant Web Publishing (fmiwp)	Allow user to modify their own password	
Access via ODBC/JDBC (fmxdbc)	Must be changed every 30 days	
Access via FileMaker Network (fmapp) Access via FileMaker Mobile (fmmobile)	Minimum password length: 5 characters	
Access via XML Web Publishing – FMS only (fm	Available menu commands:	

- 4. In the Custom Record Privileges dialog that pops up, select the first table.
- 5. Press the View drop-down menu and select limited....

Table Name	View	Edit	Create	Delete	Field Access	
Contacts	limited	limited	yes	limited	all	
hones	limited	limited	yes	limited	all	
Globals	yes	yes	yes	yes	all	Step
CNS Audit Log	yes	-	yes	-	all	
CNS Access Log	yes	yes	yes	yes	all	
CNS Audit Prefs	yes	yes	yes	yes	all	
Any New Table]	yes	yes	yes	yes	all	
						Step
Set Privilege	s View	Edit limit	Create yes	Delete	Field Access	

6. In the Specify Calculation dialog that pops up, change the View drop-down to External Functions.



- 7. In the list of functions, scroll down until a line for CNSAudit\_RecordView is visible and double-click it.
- 8. Determine if your database will only be used by client versions of FileMaker Pro 11 or above:
  - a. If so, replace the TableName parameter with the Base Table Name of the table you are editing the privileges of.
  - b. If not, specify any Table Occurrence Name of the table you are editing the privileges of. (At the top of the Specify Calculation dialog is the Evaluate this calculation from the context of setting. You can use the same Table Occurrence name in your calculation as is selected in that setting.)
- 9. Press OK to close the Specify Calculation dialog.
- 10. Repeat steps 5-9 for each table in the Custom Record Privileges dialog. (Once the CNSAudit\_RecordView function has been added to one calculation, copy and paste it to the other ones, or just retype it, and skip selecting the External Functions repeatedly. Make sure you update the TableName parameter for each table, though.)
- 11. Press OK to close the Custom Record Privileges dialog.
- 12. Press OK to close the Edit Privilege Set dialog.
- 13. Repeat steps 3-12 for each custom privilege that needs modifying.
- 14. Press OK to close the Accounts & Privileges / Manage Security dialog.

Once these Custom Record Privileges are set up, the plug-in will add a record to the CNS Access Log table anytime a user views a record in the database.

#### Preventing database modification if CNS Audit is not present

If CNS Audit is not installed or not enabled on a machine, any modifications to the database will not be recorded to the CNS Audit Log. To correct this behavior, some validation options can be added to prevent modification to the database. Follow these steps to prevent modification when CNS Audit is missing:

- 1. Open the Database file and go to Define / Manage Database.
- 2. Switch to the Fields tab and select the first table from the the Table drop-down menu in which auditing has been added.

		Stop 2
	Tables Fields Relationships	Otep 2
Table: Contacts	11 fields View by: creation order	
Field Name	Type Options / Comments (Click to toggle)	
\$ Serial#	Number Auto-enter Serial	
ContactID	Text Auto-enter Calculation	
FirstName	Text	
‡ LastName	Text	
Company	Text	
Address	Text	
≠ City	Text	
	Text	Step 3
± 7in	Number	
+ CNS Audit Timestamp	Timestamp Modification Timestamp (Date and Time), Always Validate,	
CNS Audit Trigger	lext Auto-enter Calculation replaces existing value	
		Step 4
Field Name: CNS Audit Time	estamp Type: Timestamp 🖨 Options	
Comment:		
Comment: Create	Change Duplicate Delete Copy Paste	

- 3. Select the CNS Audit Timestamp field that was created when the database was set up for tracking field changes.
- 4. Press Options.
- 5. In the Options for Field dialog that pops-up, switch to the Validation tab.
- 6. Select Always in the Validate data in this field: section.

Options for Field "CNS Audit Timestamp"	
Auto-Enter Validation Storage Furigana	Ste
Validate data in this field:	0.0
Always     Only during data entry	Ste
Allow user to override during data entry	
Require:	
🗌 Strict data type: 🛛 4-Digit Year Date 🚔	
Not empty Unique value Existing value	
Member of value list: <a>No Lists Defined&gt;</a>	
In range: to	Ste
✓ Validated by calculation Specify	
Maximum number of characters: 1	Ste
☑ Display custom message if validation fails	
Modification to this database has been disabled because changes cannot be recorded to the Audit Trail log. Please make sure CNS Audit has been installed and enabled.	
Cancel OK	

- 7. Uncheck the Allow user to override during data entry option in the Validate data in this field: section.
- 8. Check the Validated by calculation option in the Require: section.
- 9. In the Specify Calculation dialog that pops up, type into the calculation: If ( CNSAudit\_Version = "?"; 0; 1)



- 10. Uncheck the Validate only if field has been modified option near the bottom of the Specify Calculation dialog.
- 11. Press OK to close the Specify Calculation dialog.
- 12. Optional: Back on the Options for Field dialog, check the Display custom message if validation fails option and enter in something similar to: Modification to this database has been disabled because changes cannot be recorded to the Audit Trail log. Please make sure CNS Audit has been installed and enabled.
- 13. Press OK to close the Options for Field dialog.
- 14. Repeat steps 3-13 for each table that has been set up for auditing.
- 15. Close the Define / Manage Database dialog.

## Setting up Multiple Files / Data Separation Model

If your database solution is made up of multiple related files, such as in a solution that uses the Data Separation Model, there are a few extra steps that need to be done for CNS Audit to correctly audit your databases.

#### Make sure all files have a reference to the CNS Audit tables

Every file in the solution will need an external Table Occurrence reference to the three CNS Audit tables, CNS Audit Log, CNS Access Log, and CNS Audit Prefs. It does not matter which file the actual CNS Audit tables are in, and they can even be in a file all by themselves if you want, but every file in the solution needs to have access to them. Also, make sure you do not rename the Table Occurrences.

#### Modify the CNS Audit Trigger fields

In each of your tables that you have set up for auditing by adding the CNS Audit Timestamp and CNS Audit Trigger fields, you will need to make a small modification to the CNS Audit Trigger calculation.

- 1. Open the Database file and go to Define / Manage Database.
- 2. Switch to the Fields tab and select the first table from the Table drop-down menu in which auditing has been added.

	Tables	Cialda Deletionaliza	Step
-	Tables	Fields Relationships	0.00
Table: Contacts	11 fields	View by: creation order	
Field Name	Туре	Options / Comments (Click to toggle)	
≠ Serial#	Number	Auto-enter Serial	
+ ContactID	Text	Auto-enter Calculation	
<ul> <li>FirstName</li> </ul>	Text		
<ul> <li>LastName</li> </ul>	Text		
+ Company	Text		
<ul> <li>Address</li> </ul>	Text		
♦ City	Text		Ctor
<b>≠</b> State	Text		Step
¢ Zip	Number		
CNS Audit Timestamp	Timestamp	Modification Timestamn (Date and Time). Always Validate	
<ul> <li>CNS Audit Trigger</li> </ul>	Text	Auto-enter Calculation replaces existing value	
			Ster
			Step
Field Name: CNS Audit Trigg	a r	Tune: Text	Step
Field Name: CNS Audit Trigg	ger	Type: Text 🗘 Options	Step
Field Name: CNS Audit Trigg	ger	Type: Text Options	Step
Field Name: CNS Audit Trigg Comment:	ger	Type: Text Options	Step
Field Name: CNS Audit Trigg Comment: Create	ger Change (	Type:  Text  Options    Duplicate  Delete  Copy	Step
Field Name: CNS Audit Trigg Comment: Create	ger Change (	Type:  Text  Options    Duplicate  Delete  Copy	Step

- 3. Select the CNS Audit Trigger field you created when setting up the database for tracking field changes.
- 4. Press Options.
- 5. In the Options for Field dialog that pops-up, switch to the Auto-Enter tab, and click the Specify... button next to the Calculated Value option.

<ul> <li>Creation Date</li> <li>Modification Date</li> <li>Serial number</li> <li>Generate: On creation On commit</li> <li>next value 1 increment by 1</li> <li>Value from last visited record</li> <li>Data:</li> <li>Calculated value Specify</li> <li>Do not replace existing value of field (if any)</li> <li>Looked-up value Specify</li> </ul>		Creation Date	
<ul> <li>Serial number</li> <li>Generate: On creation On commit</li> <li>next value 1 increment by 1</li> <li>Value from last visited record</li> <li>Data:</li> <li>Calculated value Specify</li> <li>Do not replace existing value of field (if any)</li> <li>Looked-up value Specify</li> </ul>		Modification Date	
Generate:  On creation On commit next value  Value from last visited record  Data:  Calculated value Specify  Do not replace existing value of field (if any) Looked-up value Specify		Serial number	
next value 1 increment by 1 Value from last visited record Steel Data: Calculated value Specify Do not replace existing value of field (if any) Looked-up value Specify	_	Generate: <ul> <li>On creation</li> <li>On commit</li> </ul>	
<ul> <li>Value from last visited record</li> <li>Data:</li> <li>✓ Calculated value Specify</li> <li>Do not replace existing value of field (if any)</li> <li>Looked-up value Specify</li> </ul>		next value 1 increment by 1	
<ul> <li>□ Data:</li> <li>✓ Calculated value Specify</li> <li>□ Do not replace existing value of field (if any)</li> <li>□ Looked-up value Specify</li> </ul>		Value from last visited record	Step
Calculated value Specify Do not replace existing value of field (if any) Looked-up value Specify		Data:	
Calculated value Specify Do not replace existing value of field (if any) Looked-up value Specify			
Do not replace existing value of field (if any) Looked-up value Specify		Calculated value Specify	
Looked-up value Specify		Do not replace existing value of field (if any)	
		Looked-up value Specify	

- 6. In the Specify Calculation dialog that pops up, you should see two double quotes as the last parameter to the CNSAudit\_RecordChange function.
- 7. Determine if your database will only be used by client versions of FileMaker Pro 11 or above:
  - a. If so, insert the Base Table Name of the table you are modifying between the double quotes.
  - b. If not, insert any Table Occurrence Name of of the table you are modifying between the double quotes. (At the top of the Specify Calculation dialog is the Evaluate this calculation from the context of setting. You can use the same Table Occurrence name in your calculation as is selected in that setting.)

$) \bigcirc \bigcirc$	Specify Calculation	n	
Evaluate this calculation from	n the context of: Contacts	\$	
Current Table ("Contacts")	Operators	View: External functions	
Serial# ContactID FirstName LastName Company Address City State Zip CNS Audit Trigger = CNSAudit_RecordChann /*In Multi-File and/or I Table Occurrence of th 11].*/	e( CNS Audit Timestamp ; CNS Data-Separation Solutions, use is Base Table [FMP 7 through 1	CNS Audit CNSAudit_AccessLog( Action {; N CNSAudit_Configure{( Option {; P CNSAudit_Init CNSAudit_ListSiblingIDs( TableN CNSAudit_RecordChange( CNS A CNSAudit_RecordDelete( TableN CNSAudit_RecordDepen( TableNa CNSAudit_RecordView( TableNa	Step 7
Calculation result must be T	ext		
🗹 Do not evaluate if all refe	renced fields are empty		Step 8

- 8. Press OK to close the Specify Calculation dialog.
- 9. Press OK again to close the Options for Field dialog.
- 10. Repeat steps 3-9 for each table that you have setup for auditing.
- 11. Close the Define / Manage Database dialog.

#### Modify the Startup scripts

Every file in your solution will need a script that is called when your solution is opened. You can follow the instructions in the *Set up the database for startup and shutdown* section if you have not already. However, it's important to note that it's possible for a database file to be opened without the Startup script being run. This usually happens if FileMaker Pro opens the file to satisfy a relationship from the current file. Because of this, you need to ensure that the main database file for your solution will call the Startup scripts of every other file in your solution.

In the Startup scripts for each of the files, modify the CNSAudit\_StartupFile function to include a paragraph-mark delimited list of every file name in the solution. For example, if your solution is made up of three files named Contacts.fp?, Calendar.fp?, and Interface.fp?, then modify the CNSAudit\_StartupFile function in each file to look like:

CNSAudit\_StartupFile( "Contacts¶Calendar¶Interface" )

Note: Do not include the .fp? extension when listing the file names.

### Modify any CNSAudit\_AccessLog calls

If you are using the CNSAudit\_AccessLog function in any scripts or calculations, you will need to update those calls as well. That function also has an optional third parameter like the CNSAudit\_RecordChange function. If your database solution will only be used with FileMaker Pro 11+ clients, specify the Base Table Name of the table that is in context for the script or calculation as the third parameter. If your database solution will be used with any version of FileMaker Pro less than version 11, specify any Table Occurrence name of the table that is in context for the script or the table that is in context for the script or the table that is in context for the table that is in context for the script or the table that is in context for the script or table that is in context for the script or table that is in context for the script or table that is in context for the script or table that is in context for the script or table that is in context for the script or table that is in context for the script or table that is in context for the script or calculation as the third parameter.

After making the above four changes, your multi-file database solution will be set up for auditing with the CNS Audit plug-in.

## **Additional Information**

#### Modifying schema

One of the many steps CNS Audit takes to speed up auditing is to cache the schema information from the database. When running under versions of FileMaker Pro prior to version 11, this cached schema information can become out of sync with the actual database if you are actively developing the database (eg. adding/renaming tables, fields, and layouts). To ensure that CNS Audit is correctly auditing the database when running under versions of FileMaker Pro prior to version 11, the CNSAudit\_StartupFile function can be used at any time to force a reload of the schema information. When running under FileMaker Pro 11 or above, the plug-in is able to track changes to the schema and will reload the schema information automatically.