4 Using Digital Signatures

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4 Using Digital Signatures

Approval is often a necessary step in the processing of a form. Traditionally, forms have been approved on paper by signing them with a pen. Today, technology allows us to sign forms electronically with digital signatures. Signing electronically reduces the need to print forms and, in some ways, offers more security than paper signatures.

Informed relies on the digital signature services available via Informed signing plug-ins. Because Informed was developed with an "open architecture," Shana can easily support new signing services as they become available by simply developing new plug-ins. With a signing service installed on your computer, you can sign information electronically. The form designer configures a form for signing by drawing one or more signature cells on the form template. Each signature cell can sign the entire form or only certain parts of the form. With a properly configured form, you can easily sign completed forms and check the validity of signatures.

In addition to signing forms and verifying signatures, you can also verify the integrity of the template you're using.

This chapter describes Informed's digital signature capabilities. You'll learn how digital signatures work and the steps necessary to sign forms and verify digital signatures. You'll also learn how to verify the authenticity of associated form templates.

How it Works

Digital signature technology employs sophisticated encryption algorithms to provide reliable signer identification and fail safe tamper detection. This means that once someone has signed data electronically, the resulting digital signature can be used to:

- verify the identity of the person who signed the data
- detect whether or not the data has changed since it was signed

A digital signature is like a special number that's derived from information about the person signing and the data being signed. This number can reliably identify the signer and detect any changes in the signed data. While the digital signature is stored with the signed data, the data itself is not altered in any way.

Attached to form
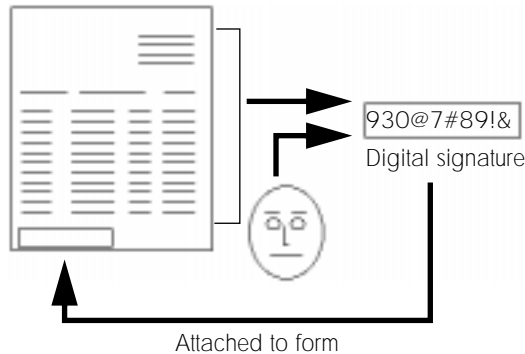
Once a digital signature is created, you can easily verify its integrity by choosing a single command. The verification process involves re-creating parts of the digital signature using current data, then comparing the results with the original signature. If they are not equal, then either the signed data or the digital signature itself has been changed or tampered with.

Before distributing a template for use in an organization, the form designer can authorize the template by signing it with a digital signature. Authorizing templates provides the same authentication and tamper detection for form templates as signing completed forms with Informed Filler does for your form data. At any time, you can find out if a template is valid by verifying its authorization signature (see "Verifying Templates" later in this chapter).

Most security products that provide digital signature services (such as Entrust by Nortel) come with an application or a means of signing entire files. For applications that have not been designed to use signing services, signing the files they create is the alternative for using these signature services.

Signing completed forms with Informed Filler offers significant advantages over signing files. You can sign parts of forms or entire forms, and the way you sign forms is more similar to the way you sign paper forms.

When you sign a form with Informed Filler, only the relevant data is signed. Each digital signature applies to some or all of the data for a single completed form, even if the data document contains many records. This means that you can sign one form, then freely change others without affecting the digital signature on the signed form. To prevent you from unintentionally changing signed data, Informed Filler locks cells once their contents have been signed.

Informed Filler provides other features that make using digital signatures easy and efficient. They include the ability to:

- see exactly which cells a particular signature cell signs
- sign multiple records at the same time
- verify multiple digital signatures at the same time
- automatically verify digital signatures so that you don't have to
- verify the integrity of associated templates

The remaining sections of this chapter provide the details of Informed Filler's digital signature features. For details specific to the different signing plug-ins included with Informed Filler, please see the on-line document "FILLPLG.PDF" (Windows) or "Informed Filler Plug-ins" (Mac OS). This document is automatically installed when you install Informed Filler and is viewed using Acrobat Reader (also included with Informed Filler).
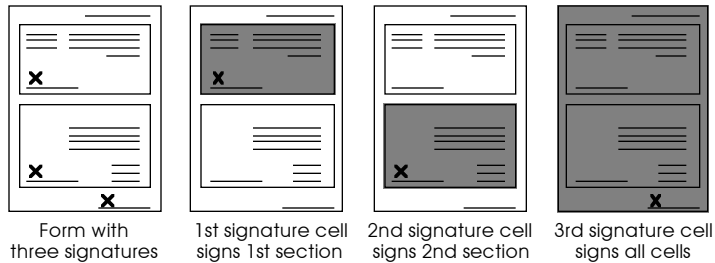
Signature Cells

A signature cell is a cell that can store a digital signature. The form designer configures a form template for electronic signing by drawing one or more signature cells on the form. A signature cell can look just like the space for a signature on any paper form.

Like any cell, a signature cell has a tab position. The tab position determines where the cell appears in the tabbing order. You can select a signature cell like any other cell: by tabbing to the cell, or by clicking the cell with the mouse. When selected, a bold frame flashes in the cell's interior.

Each form can have more than one signature cell, and each signature cell can sign different information. For example, a form that has two sections which are often filled out by two different people could have two signature cells. Each cell would sign only those cells in its respective section. You could even have a third signature cell which signs the entire form including the other two signatures.

| Form with three signatures | 1st signature cell signs 1st section | 2nd signature cell signs 2nd section | 3rd signature cell signs all cells |

In addition to signing cells, the form designer can configure a signature cell to also sign any attachments. For information on attachments, see Chapter 5, "Attachments."

You can see which cells on a form are signed by a particular signature cell by selecting the cell, then choosing **Show Signed Cells** from the Signatures submenu under Edit. This feature is useful if you are about to sign a form and want to see which cells you are signing, or if you are viewing a form that's already been signed and want to see which cells have been signed by the existing signature.

With the Show Signed Cells option selected, Informed Filler draws a red frame around each signed cell when you select the signature cell. Only those cells which are signed (or will be signed) by the selected signature cell are revealed. To turn the Show Signed Cells option off, choose **Show Signed Cells** again.

Informed Filler also allows you to see whether or not any attachments are signed by a particular signature cell. If the selected signature cell does not contain an actual signature and the cell is configured to sign attachments, you'll see a red frame around both the Attachments window and the

paperclip indicator. This is to indicate that if you sign the record in that signature cell, all of the cur-rently attached files will be signed as well. If the selected signature cell does contain a signature and the cell is configured to sign attachments, you'll see a red frame around only those attached files that were present when the record was signed.

Once a record has been signed with a signature that signs attachments, you can add other attach-ments without compromising the digital signature. Informed Filler knows which attachments a sig-nature has signed. Once an attachment has been signed, you cannot delete it without first removing the signature.

Verifying Templates

Before distributing a template for use with Informed Filler, the form designer can authorize it so that you can verify its authenticity. Otherwise, the template is vulnerable to tampering. That is, without changing the data on a completed form, a malicious user could alter the template and, in doing so, change the meaning or context of the data.

For example, suppose a loan application must go through two levels of screening before it can be approved. A loans officer interviews the client and then selects a 'Not recommended' checkbox on the application form and signs it with a digital signature. The application then goes to the bank manager who has the final authority to approve or reject the loan application.

If a person wanted that loan to be approved, he could alter the form template used by the bank man-ager so that the application appears to have been recommended by the loans officer. To do so, he would simply use Informed Designer to change the title of the 'Not recommended' checkbox field to 'Recommended,' and the 'Recommended' title to 'Not recommended.' When the bank manager views the data with the altered template, it might look like this:

Verifying the loans officer's signature would show that the data on the form has not been altered because the value of the checkbox has not changed. However, by switching the cell titles on the form template, the meaning or context of those values is different. The bank manager would be misled to believe that approval of the loan application was recommended.

In the example above, the tampering is fairly obvious and is used to illustrate the point. In real world situations, tampering could be much more subtle while still causing serious security breaches.

As mentioned previously, the form designer can raise the level of security in the electronic forms process by using digital signatures to authorize the form templates used in an organization. Authorizing templates provides the same authentication and tamper detection for your form templates as signing completed forms with Informed Filler does for form data.

When a form template has been authorized, you can verify it to make sure that it's valid before you fill out your form. Verifying a template reveals the details of the person who authorized it for use. If you verify a template and see that it was authorized by a person without proper authority, it may be an indication that the template is not authentic, and should not be used.

To verify the form template associated with the current data document, choose **Verify Template** from the Signatures submenu under Edit. If you are not already logged onto your signing service, you may be asked to do so. Informed Filler verifies the template and displays the name of the person who authorized it.

If the signature fails to verify, you'll see a different message indicating that the template, or the authorization signature itself, has been altered.

When you sign a completed form with Informed Filler, information about the version of the template you are using and the person who authorized it is included with the signature that results from signing the completed form. This information can be displayed later when verifying the signature on the completed form. See "Signing Forms and Verifying Digital Signatures."

## Signing Forms and Verifying Digital Signatures

You can sign forms that contain signature cells using Informed Filler's Sign command. You can sign one record at a time, or you can sign multiple records using the Record List window (see "Working with Multiple Records").

With a signature cell selected, you sign a form by choosing **Sign...** from the Signatures submenu under Edit. As a short cut, you can double-click an empty signature cell or press Enter (Windows) or Return (Mac OS) to choose the Sign command. If you have more than one signing plug-in installed and the form designer has not configured the signature cell to use a particular service, you'll be first asked to select the service you want to use.


Select the service you want to use from the 'Sign using' drop-down list, then click 'OK.'

If you are not already logged onto the signing service, Informed Filler will request that you identify yourself. The dialog box you see is specific to the signing service used. For some, you have to identify yourself only the first time.
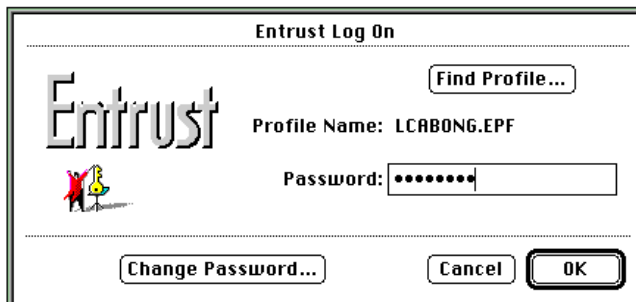
After you've identified yourself, Informed Filler creates the digital signature and stores it in the signature cell. The signature icon and your name appear in the cell's interior. Depending on how the form designer configured the signature cell, you might also see the signing date next to the signer's name.
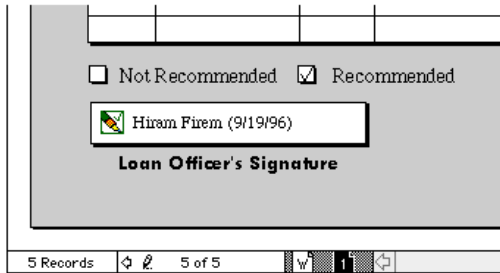
Note   You should not trust the validity of the name and date displayed in a signature cell. Only by verifying the signature can you be sure of the date and the signer's identity. The signing date may or may not be available depending on the signing service you're using.

Once you've signed a form, Informed Filler automatically locks all signed cells to prevent unintentional changes to the signed information. Although you can select a signed cell, you cannot change its value. The pencil in the collection information box provides a visual indication that the cell is locked.

After signing a form, anyone with the same signature service installed on their computer can verify the digital signature. To verify a signature, select the signature cell and choose **Verify...** from the Signatures submenu.

The verification process involves re-creating parts of the digital signature using current data, then comparing the results with the original signature. If they match, the signature is valid. This means that the person identified on the verification dialog is truly the person who signed the form, and the signed data has not changed in any way.

If verification of a digital signature fails, you'll see a message dialog indicating so. Verification will fail if the originally signed data or the digital signature itself has been changed or tampered with.

Like signing, you might be asked to identify yourself when you choose the Verify command. Depending on your setting of the 'Display template authorization when verifying data' preference, you'll see either a dialog box with additional options, or only the results of verifying the data signature. With the preference turned on, if the digital signature verifies successfully, Informed Filler will display the following dialog box.
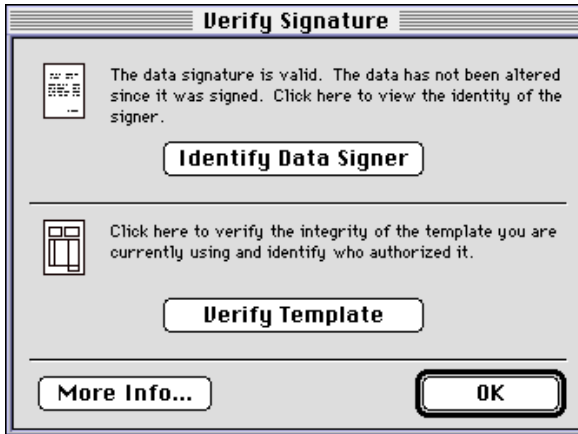
Using the controls on the Verify Signature dialog box, you can identify the person who signed the data, you can verify the template you are currently using, and you can display information about the template that was used when the data was originally signed.

To see the name of the person who signed the data, click the 'Identify Data Signer' button. Informed Filler displays the person's name in a dialog box.
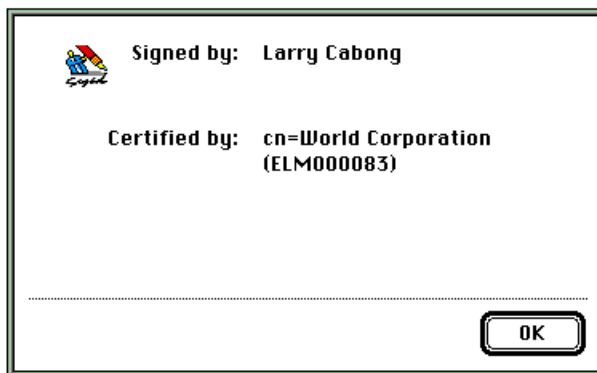
If you click the 'Verify Template' button, Informed Filler verifies your current template and displays the name of the person who authorized it. You can also verify your template by choosing **Ver-ify Template** from the Signatures submenu under Edit. See "Verifying Templates" earlier in this chapter for more information.

When a completed form is signed with Informed Filler, information about the version of the template being used and the person who authorized it is included with the signature. To view this information, click the 'More Info...' button. The Template Authorization dialog box appears.
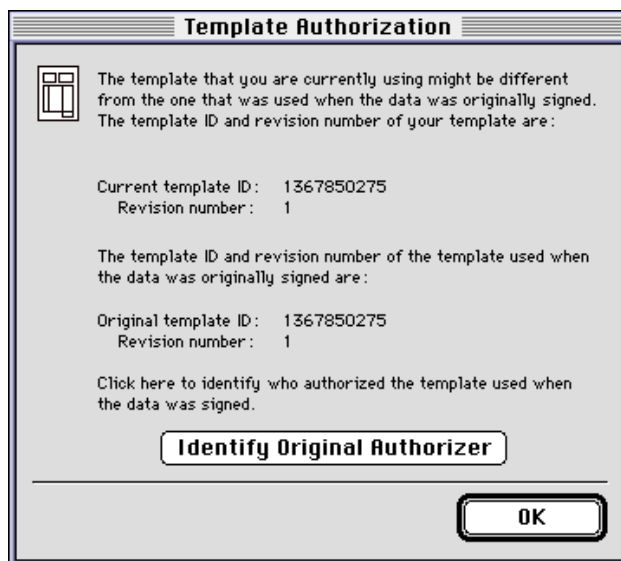
The Template Authorization dialog box allows you to compare both the template ID and the revision number of the template you are currently using with those of the template that was used when the data was originally signed (which may be different). You can see the name of the person who authorized the template that was used when the completed form was signed by clicking the 'Identify Original Authorizer' button.

Having access to the names of the people who authorized both templates is helpful if there is any discrepancy between the two templates. Using this information, you can quickly tell if either one of the templates was authorized by a person without proper authority.

If the 'Display template authorization when verifying data' preference is turned off, only the identity of the data signature (that is, the dialog box that appears when you click 'Identify Data Signer' on the Verify Signature dialog box) is displayed when you verify a signature. To change your preference setting, choose **Preferences…** from the Edit menu and click the Security icon to display the Security preferences panel.
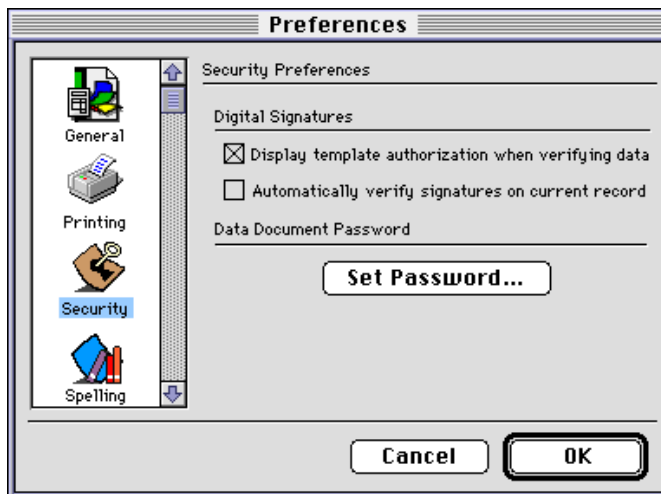
Change the setting then click 'OK.' To cancel the Preferences command instead, click 'Cancel.'

For information about verifying multiple digital signatures at the same time, please see "Working with Multiple Records" later in this chapter.

The Signature Icon

The signature icon is a standard icon that applications use to indicate the presence of a digital signature. With Informed Filler, the name of the signer, and optionally, the date that the form was signed, appears to the right of the signature icon.

The state of a digital signature can be determined only by verifying the signature (see "Signing Forms and Verifying Digital Signatures"). For most signing services, the signature icon is a visual indicator of the signature's validity.

When you view a signed record, the signature icon will contain a question mark. This indicates that the validity of the signature is unknown. If the signature is successfully verified, you'll see a checkmark inside the signature icon. An invalid signature will display an "x" in the signature icon.
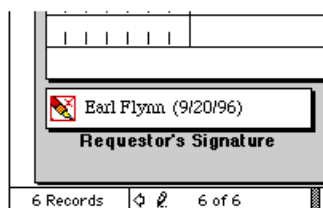
Note   Each time you view a signed record, the signature icon contains a question mark (even if you've recently verified the signature). For example, if you verify the signature on record number 6 in your data document, the signature icon displays a checkmark. If you move to another record in the data document and then return to record 6, the signature icon will again contain a question mark. This is because, while difficult, it's possible that the data could be tampered with between the time the signature was verified and the time you viewed the record again.

In order to sign forms and verify digital signatures, you must have the signing service and the appropriate Informed signing plug-in installed on your computer. If either of these are missing, you can still open forms that contain signature cells. However, rather than seeing the standard signing service-specific signature icon, a generic signature icon will appear instead.

Automatic Verification

Rather than manually verifying each digital signature as you find or browse through different records, Informed Filler can automate the verification process for you. With the 'Verify signatures on current record' preference selected, Informed Filler will automatically verify all digital signatures on the form each time the current record changes (that is, whenever you display a different record in the form window).

To activate the auto-verification preference, choose **Preferences...** from the Edit menu and click the Security icon to display the Security preferences panel. Select the 'Verify signatures on current record' checkbox.
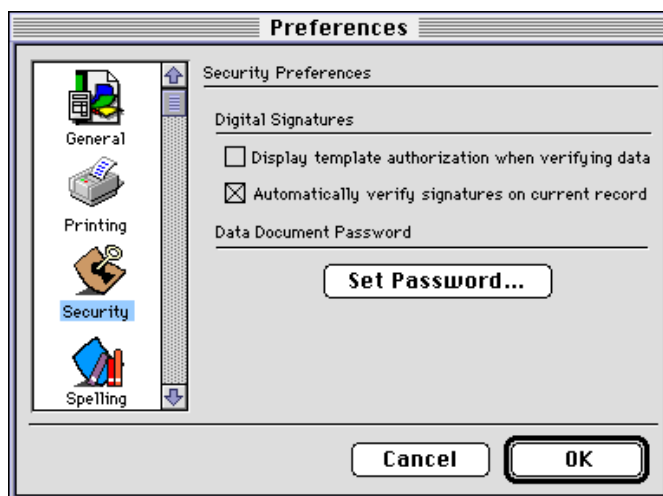
If Informed Filler detects an invalid signature during automatic verification, a message will appear indicating so.

At least one signature on the current record is invalid.

OK
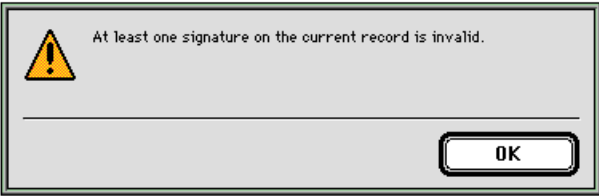
Since verifying a digital signature can take several seconds or more, you may want to use the auto-verification preference only if the computer you're using is fast enough.

Working with Multiple Records

To work with more than one record, Informed Filler provides the Record List window. As explained in Chapter 8, "Manipulating Records," the Record List window displays records in a list, making it easy to see the information of multiple records at a glance. The Record List window also makes it easy to sign multiple records or verify multiple digital signatures at the same time.

Like any cell, a signature cell can appear as a column on the Record List. For each record displayed, the name of the person who signed the record is shown in the signature cell's column.

If you need to sign more than one record, rather than signing each one individually, you can sign them all at once using the Record List. With the Record List containing the records that you want to sign, select the signature cell column and choose **Sign...** from the Signatures submenu under Edit. As always, you'll be asked to identify yourself in a manner according to the signing service you're using. Informed Filler will then sign all records in the Record List.

You can verify multiple digital signatures in the same way. With a signature cell column selected on the Record List window, choose **Verify...** from the Signatures submenu. Informed Filler will verify the digital signatures for all signed records on the Record List. After all signatures have been verified, you'll see a message indicating the results.

> ⚠ 28 of the 32 records on the Record List are signed. At least one signature is invalid. Records with invalid signatures will be selected on the Record List.
>
> [OK]

If one or more digital signatures are found to be invalid, Informed Filler will identify the corresponding records by selecting them on the Record List window. An exclamation mark will appear to the left of any invalid signatures on the Record List.

Logging Off Your Signing Service

When you sign a form or verify a signature, Informed Filler may request that you identify yourself. For some signing services, once you've identified yourself, or logged on, the first time after launching Informed Filler, you'll remain logged on until you quit Informed Filler. This allows you to sign forms and verify signatures without having to identify yourself each time.

Care should be taken to never leave your computer unattended once you've logged on to your signing service. Otherwise a different person could use your computer to falsely sign forms using your identity. To explicitly disconnect, or log off, from your signing service, choose the **Log Off Service** command from Informed Filler's Edit menu. After doing so, the next time you sign a form or verify a signature, you may be asked again to identify yourself.