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Break the vicious circle:
Correct formulas trapped in
circular references

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using these quick blur effects

From the Editor

You want to be as productive as possible when you create Excel spreadsheets, and formula errors are one thing that hinders your productivity. That's why I cover Circular References in my first article. Find out what they are and how simple it can be to troubleshoot them.

You've heard the security horror stories, so prevent them for happening to you. Read my Information Systems Protection article to learn how to manage your wireless networks before it's too late.

After you work hard to protect your network, it's time for play. Find out how you can use Adobe Illustrator to make your images fly off the page.

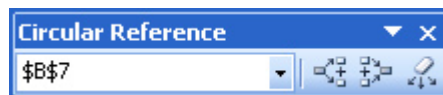
MICROSOFT OFFICE PRODUCTIVITY

Break the vicious circle: Correct formulas trapped in circular references

Formula errors are frustrating when you're trying to finish a spreadsheet for your boss before his last-minute meeting. One error that's easy to accidentally produce is a circular reference. A circular reference occurs when a formula includes a cell reference that points to the same address as the cell containing the formula itself. The bottom line is that a circular reference prevents Excel from properly calculating your formula. Fortunately, Excel makes circular references easy to correct with a special toolbar, as shown in **Figure A**.

Follow our example

To follow along with our examples, just create a new worksheet based on the one shown in **Figure B**. This worksheet outlines the monthly sales for each salesperson in the department along with the sales that aren't assigned to a salesperson because they aren't collected. In addition, it displays what percentage of the total sales is still uncollected.



A You can troubleshoot circular references using the Circular Reference toolbar.

Create some sample circular references

Excel alerts you to most types of formula errors simply by displaying the name of the error in the problem cell. However, Excel notifies you about circular references in a different way. First, Excel displays a message box. Then, it bombards you with the Microsoft Excel Help window, the Circular Reference toolbar, and a battery

	A	B	C	D	E
1	Salesperson	Monthly Sales		Uncollected Sales	
2	June Wilders	\$9,482.00		Amount	\$6,306.00
3	Eric Mason	\$7,784.00		Percentage	
4	Kelly McDermott	\$5,839.00			
5	Greta Schultz	\$4,468.00			
6	Anthony Arlington	\$5,683.00			
7	Total				

B We'll use this sample worksheet to create and correct circular references.

Related Courses

- Excel 2000, 2002, 2003, 2007 & 2007 New Features
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of tracer arrows in your worksheet. Let's create a formula that totals monthly sales to see this process in action.

To see how a circular reference behaves:

1. Select cell B7.
2. Type the formula =SUM(B2:B7).
3. Press [Enter] to accept the formula.

When you press [Enter], Excel displays the message box shown in **Figure C**. To troubleshoot the circular reference using the Circular Reference toolbar, click OK. Then, minimize or close the Microsoft Excel Help window to get it out of the way, since you won't need to use it.

Note: If the Circular Reference toolbar isn't displayed automatically, select View | Toolbars | Circular Reference to display it.

Pinpoint direct references

When you return to your worksheet, the status bar (located at the bottom of the application window) displays the source of the error with the information Circular: B7. In addition, the Circular Reference toolbar can tell you which worksheet cells are implicated in the detected circular reference. Just expand the Navigate Circular Reference dropdown list on the Circular Reference toolbar to reveal the culprit, \$B\$7, and then select

it to activate the corresponding cell. You can even make Excel highlight the other cells included in the formula by clicking the Trace Precedents button on the Circular Reference toolbar.

Version difference: In Excel 2000, cell B7 contains a blue dot to indicate that the cell's formula contains a direct reference to itself. Unfortunately, this visual indicator was removed in Excel 2002.

The circular reference we just created is actually an easy one to troubleshoot. In

this case, the circular reference occurs because the formula is dependent on itself. Upon closer inspection of the formula in cell B7, you'll notice that the formula attempts to include the value of

cell B7 — i.e., the value of itself — in its calculation. The problem is, when the formula adds the values in cells B2 through B7, the result creates a new value for cell B7.

Consequently, the formula recalculates itself using the new B7 value. The result is yet another new B7 value, which initiates another recalculation, ad infinitum. Excel continues to recalculate formulas like this 100 times; if it can't rectify the

Dependent cells vs. precedent cells

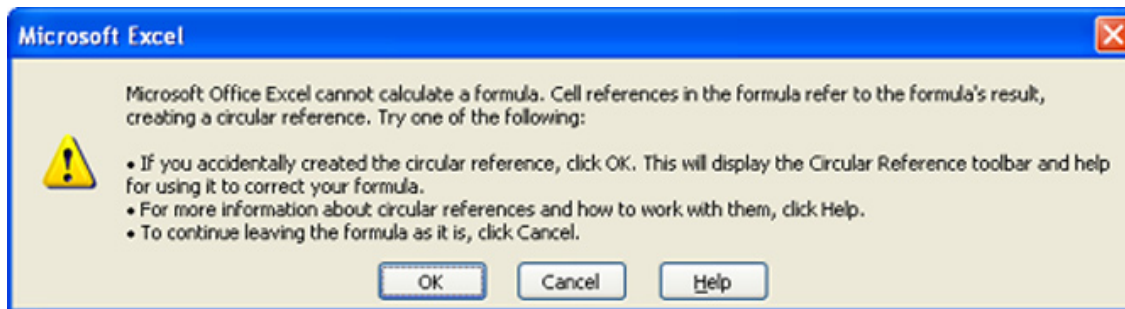
A *dependent cell* contains a formula that refers to other cells, known as *precedent cells*. The formula results produced by a precedent cell directly affect the results of any of its dependent cells. So if a precedent cell contains erroneous data, its dependent cells will display erroneous data too. If you have trouble remembering which is which, think of it this way: if you were to demonstrate dependent and precedent cells using a family tree analogy, precedent cells would be the parent cells and dependent cells would be their offspring.

formula result after the 100th calculation (i.e., iteration), it displays a circular-reference warning message like the one shown in **Figure C**. To fix the problem, change the formula in cell B7 to =SUM(B2:B6).

Sniff out indirect references

When a formula refers to itself, it's easy to pinpoint the circular reference and fix it. However, as your formulas become more complex and dependent on the results of other formulas, you're more likely to have an indirect circular reference.

For example, let's calculate what percentage of the total sales consists of uncollected sales.



C It's easy to create a circular reference by accident. Excel informs you when you do so by displaying this message box.

	A	B	C	D	E	F
1	Salesperson	Monthly Sales		Uncollected Sales		
2	June Wilders	\$9,482.00		Amount	\$6,306.00	
3	Eric Mason	\$7,784.00		Percentage	19%	
4	Kelly McDermott	\$5,839.00				
5	Greta Schultz	\$4,468.00				
6	Anthony Arlington	\$5,683.00				
7		Total			\$0.00	
8						
9						
10						
11						

D You can pinpoint indirect circular references with help from tracer arrows.

To create an indirect circular reference:

1. Select cell E3 and click the Percent Style button on the Formatting toolbar to apply the Percent style.
2. Enter the formula =E2/B7 in cell E3, and then press [Enter].
3. Change the formula in cell B7 to =SUM(B2:B6,E3). This ensures that the total sales include the uncollected sales.

4. Press [Enter] to save the new formula. Excel detects a circular reference and displays the message box shown in **Figure C**.

5. Click OK to begin troubleshooting the error.

This time, Excel displays tracer arrows that point from cell B7 to cell E3 and back again, as shown in **Figure D**. These arrows indicate that the values in each of these cells have a direct impact on the values calculated by the cells they point to.

To troubleshoot the indirect circular reference:

1. Expand the Navigate Circular Reference dropdown list to reveal which cells are implicated in the circular reference.
2. Select the first reference, \$E\$3, as shown in **Figure D**, to select the corresponding cell and display its formula in the Formula Bar. The formula in cell E3, =E2/B7, doesn't contain a direct reference to itself, cell E3. However, it does contain a reference to cell B7, the other cell implicated in the circular reference.

3. Choose \$B\$7 from the Navigate Circular Reference dropdown list to reveal its formula. Upon closer inspection of the formula, =SUM(B2:B6,E3), you'll notice that it incorrectly adds the value in cell E3 to the sales total instead of adding the value in cell E2.
4. To remedy the error, change the formula in cell B7 to =SUM(B2:B6,E2). When you press [Enter], Excel recalculates your formula.
5. When Excel encounters no circular reference, the tracer arrows, the Circular Reference toolbar, and the status bar message all disappear. 🎯

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Safeguard your data! Manage preferred wireless networks before it's too late

Broadband routers serve as both internet gateways and wireless access points. While your users think that's great news, it means it's more important than ever to not only control access to your wired network but to also restrict your users from inadvertently connecting to someone else's wireless network. The latter case is particularly risky because, once they're connected to a foreign wireless network, the machine is a valid node on that network and, as such, is at the mercy of its owner. We'll show you how to manage those wireless connections to prevent such a dangerous connection.

It all starts with an SSID

One of the tasks to complete when setting up a wireless base station is providing a wireless network name for the device. This name is known as its *Service Set Identifier (SSID)*, and is shown in **Figure A**. You typically also specify the device's visibility, i.e., whether it should advertise its name to wireless clients or conceal it. As you'll discover, the Wireless Zero Configuration (WZC) service, which is responsible for managing wireless connectivity under Windows XP and Windows Server 2003, relies heavily on the SSIDs' visibility.

Sum up the WZC service

When you set up a wireless adapter on a Windows XP or Windows Server 2003 machine, the WZC service scans the adapter's broadcast area, and identifies base stations that are advertising their SSID. It gathers these SSIDs into a list of wireless networks, then notifies you that

these networks are available. When you connect to one of the available networks, the WZC service automatically adds the network to your preferred networks list. Because moving the machine to a new location causes this process to repeat itself, you can end up with potentially several different preferred networks.

If you have several preferred wireless networks but the most preferred network isn't available, the WZC service attempts to configure a wireless connection to the next preferred network in the list, moving down the list until it finds a suitable connection. When the most preferred network is available again, the WZC service automatically switches the wireless connection to it.

The WZC service doesn't scan for hidden SSIDs. Instead you need to manually add a hidden SSID to the preferred network list. However, the WZC service always attempts a connection to a preferred network that is broadcasting its SSID before it

connects to a hidden preferred network, even if the hidden wireless network is higher in the list of preferred wireless networks.

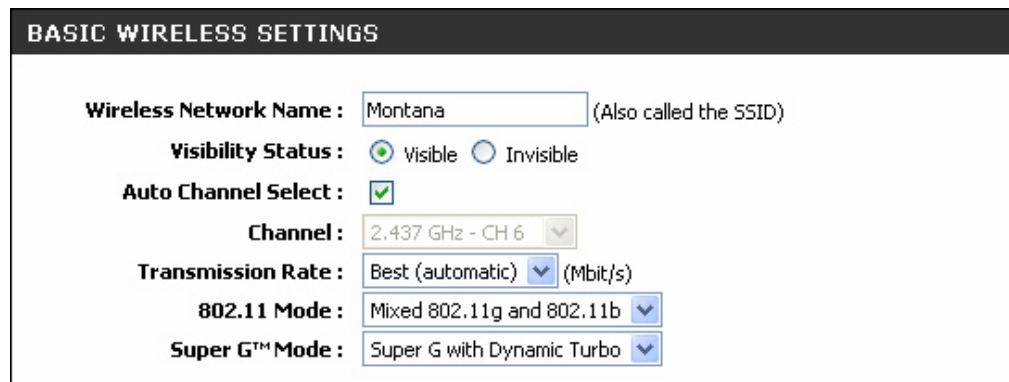
View available wireless networks

It's convenient to place your wireless adapter's icon in the system tray. This allows you to easily enable or disable it, and to view available wireless networks among other things. To add the wireless interface to the system tray:

1. Open the Network Connections control panel.
2. Right-click on the wireless adapter. Choose Properties.
3. Select the Show Icon In Notification Area When Connected check box; close the Properties dialog box.
4. Right-click on the wireless interface and select the action you want to perform.

Related Courses

- Certified Ethical Hacker
- Certified Network Defense Architect (CNDA)
- SCNA Advanced Security Implementation
- SCNP Hardening the Infrastructure
- SCNP Network Defense and Counter Measures



A A base station that broadcasts its SSID advertises its network name to wireless clients.

Connect to a wireless network

Once you set up the wireless interface, you can connect to a wireless network in your broadcast area. When you want to view the available networks, one of two behaviors occurs:

- If you're using the device manufacturer's wireless configuration

utility, Windows informs you that it can't configure the wireless connection and that you must use the manufacturer's utility.

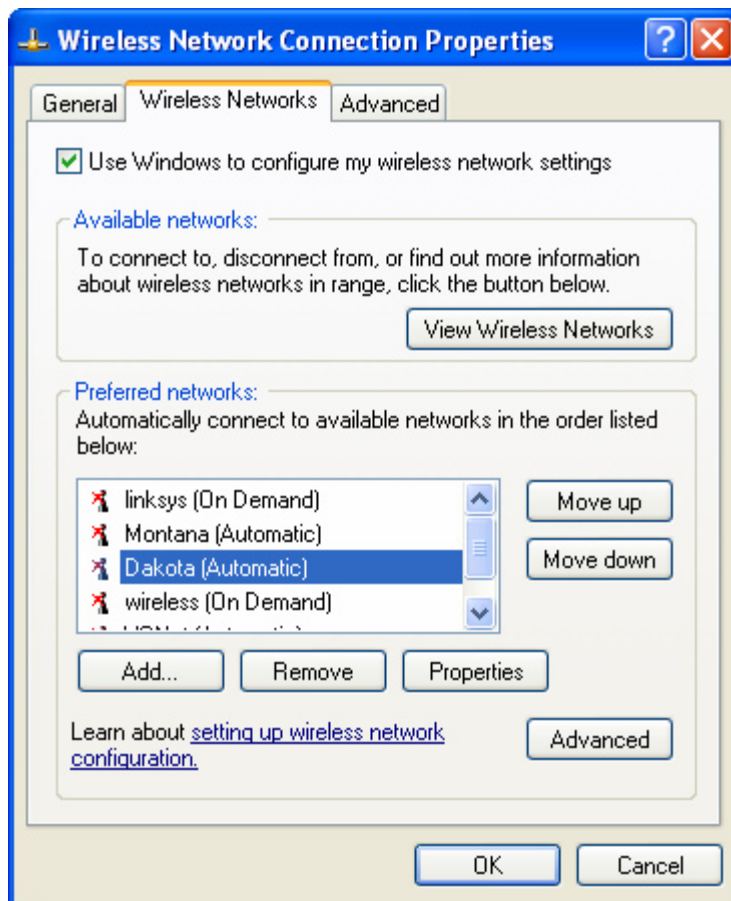
- If you're using the Windows' Wireless Zero Configuration service, a list of available wireless networks appears.

To connect to an available wireless network:

1. Right-click on the wireless adapter's icon in the system tray and choose View

Available Wireless Networks.

2. In the Choose A Wireless Network pane, select a wireless network; click Connect.
3. If the target network is secured, enter your credentials; if it's unsecured, click the Connect Anyway button.



B Even a standard user can click on a shielded button, but he can't continue without administrator access.

Manage preferred networks

Whenever you connect to a wireless network that appears in the available wireless networks list, Windows automatically adds the network to the preferred networks list, as shown in **Figure B**. While this behavior may be desirable when your users roam, it presents a problem if you want them to connect only to trusted networks. For example, they may think they're connected to their wireless access point when, in fact, they're actually connected to someone else's. To manage preferred networks:

1. In the Network Tasks pane, click on the Change The Order Of Preferred Networks link.
2. To change the order in which you connect to preferred networks, select the network name and then click either the Move Up or the Move Down button.
3. To add a network manually (e.g., a hidden SSID), click Add, then, on the Association tab, enter the network name or SSID.
4. To remove a network, select the network name and click Remove.
5. To prevent automatically connecting to a network in the future, select the network name, click the Properties button, and, on the Connection tab, deselect the Connect When This Network Is In Range check box.

Note: You must select the Connect When This Network Is In Range check box if you want to connect to a wireless network that hides its SSID.

Designate network types to access

In addition to managing preferred networks individually, you can manage the types of networks you want to access. There are two types of wireless networks:

- **Infrastructure networks.** A wireless access point is connected to a wired network. The wireless interface in the access point is bridged to its wired interface, giving wireless clients access to the wired network as well as to other wireless devices.

- **Ad Hoc networks.** This type of network has no wires. Computers connect to each other wirelessly in a peer-to-peer fashion.

Finally, you can specify whether you want to connect to wireless networks in the broadcast area even though they aren't on your preferred networks list. To specify the types of networks to access:

1. On the Wireless Network tab, click the Advanced button.
2. In the dialog box that appears, select the option button corresponding to the type of network you want to access.
3. Select the Automatically Connect To Non-preferred Networks check box

only if you want to connect to wireless networks that aren't on your preferred networks list.

Zoom in on the connection process

Let's now take a closer look at the connection process. The WZC service always attempts connections in the order listed here:

1. A preferred network with a visible SSID. If a preferred network is configured to connect automatically, the WZC service attempts to connect to it, based on the order of precedence in the preferred networks list.
2. A preferred network with an invisible SSID. If the WZC service can't make a successful connection, it attempts to connect to a preferred network whose SSID is hidden, based on the order of precedence in the preferred networks list.

3. A preferred ad hoc network. If the WZC service can't make a successful connection, it attempts to connect to an ad hoc network in the list of preferred networks.

4. A new ad hoc network. If the WZC service can't make a successful connection, it configures the wireless network adapter to act as the first node in an entirely new ad hoc network.

At this point, the WZC service checks the non-preferred network setting. If it can't make a successful connection using any of the previous methods, it checks the Automatically Connect To Non-preferred Networks setting. Then, it continues with the following attempts:

1. A non-preferred network. If Automatically Connect To Non-preferred Networks is enabled, the WZC service attempts to connect to the available networks in the order in which the wireless adapter sensed them.
2. A random wireless network. If all connection attempts to non-preferred

networks fail or if Automatically Connect To Non-preferred Networks is disabled, the WZC service creates a random wireless network name and places the wireless network adapter in infrastructure mode.

After the initial connection is made, the WZC service can switch connections if it determines that a change in the wireless environment requires it, as described here:

- If the Windows wireless client is already connected to a wireless network and there is no other preferred network higher in the preference list, the WZC service maintains the existing connection.
- If the Windows wireless client is already connected to a wireless network but a more preferred wireless network becomes available, the WZC service disconnects from the currently connected wireless network and attempts to connect to the more preferred wireless network.

Get started with WZC

If you haven't used WZC before, or are just getting started with a wireless network, you may want a few pointers at the outset. For information on installing a wireless adapter and choosing WZC, see the infobox "Streamline WiFi troubleshooting efforts."

Many prefer using WZC because it allows you to eliminate third-party tools, which offers two benefits. First, when you troubleshoot wireless problems, you needn't consider a third-party tool as the problem. Second, you streamline your operating system and PC maintenance. 🌐

Streamline WiFi troubleshooting efforts

If you're about to install an aftermarket wireless adapter that supports Windows' Wireless Zero Configuration service, you have the option of using the device manufacturer's wireless configuration utility or Windows' Wireless Zero Configuration service—but you can't use both simultaneously.

To install a wireless interface:

1. Run the setup utility provided with the wireless device to install the drivers and the wireless configuration utility; restart your computer.
2. Insert the wireless adapter into the appropriate expansion interface, typically a PC Card slot or a USB port.
3. Respond to the Found New Hardware Wizard's prompts to finish setting up the device.
4. Right-click on the system tray icon representing the wireless configuration utility, then select the action you want to perform.

To use WZC instead of a manufacturer's service:

1. Open the Network Connections control panel.
2. Right-click on the wireless adapter and choose Properties.
3. On the Wireless Networks tab, select the Use Windows To Configure My Wireless Network Settings check box.

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Put your image in motion using these quick blur effects

It's difficult to portray motion on a flat surface without the use of animation. Although Illustrator can create web animation for export, it's useless on printed material. Fortunately, with a little creativity and Illustrator's blend and blur effects you can get your objects moving in no time, as shown in **Figure A**. Let's get started.

Find a vector graphic

To help you apply this technique to a graphic, you should choose artwork that lends itself to motion. Open an image you want to use to create the effect of motion, such as a car, bus, or motorcycle. We'll use a car for our example.

If you don't have an image of your own to use, and if you're using CS2, you can find an image from the Tiki Symbol Library.

1. Open a new document in Illustrator CS2.
2. Choose Window > Symbol Libraries > Tiki.
3. Drag the symbol named Automobile from the Tiki palette to the left side of your work area.

With your artwork in place, it's time to create a trail of motion behind it.

To create a copy and expand the car:

1. Select the car with the Selection tool and copy and paste it.
2. Move the copy of the car a good distance behind the original car, as shown in **Figure B**.
3. Choose Object > Expand to open the Expand dialog box.

4. Select both the Object and Fill check boxes.

5. Click OK to create a set of paths from the car symbol.

Transform the car

You just expanded the symbol to create an actual, editable path. Now, you're no longer constrained to just manipulating a copy of a symbol, so you have many more creative options.

To transform the car copy:

1. With the expanded car selected, [Alt]-click on the Add To Shape Area button on the Pathfinder palette.
2. Apply a white Fill and a Stroke of None to the copy of the car.

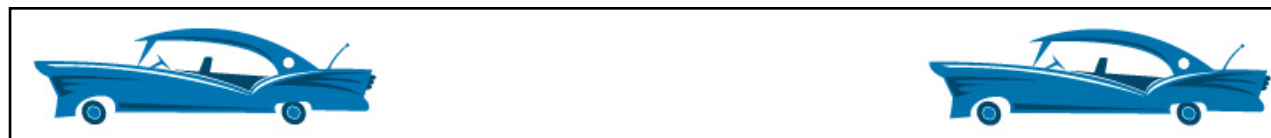
3. Apply 0% Opacity using the Transparency palette to make your image look like **Figure C**.

To set the blend options:

1. Select the original car and choose Object > Arrange > Bring To Front.
2. Choose Object > Blend > Blend Options to display the Blend Options dialog box.
3. Choose Specified Steps in the Spacing pop-up menu.
4. Enter 18 in the text box.



A Using blend and blur effects, you can create the illusion of motion.



B You'll want to start out with two images, and then transform them into one.

Related Courses

- Illustrator 10, CS, & CS2

5. Click the Align To Path button and click OK.

6. Choose the Blend tool.

7. Click on the original car, and then click on the copied transparent car. Your blend should look like **Figure D**.

Create a blurred trail

With your blend in place, it's time to create a blurred movement. We'll apply

effects to both the original car as well as the blend trail.

To apply a blur between the original and the invisible car:

1. Select the entire blend using the Selection tool.

2. Choose Darken from the pop-up menu on the Transparency palette.
3. Select the original car with the Direct Selection tool.
4. Choose Effect > Stylize > Feather to display the Feather dialog box.
5. Set the Feather Radius to .1 in.



C Use the Opacity slider to make your image transparent.



D The Blend tool helps you start to create the motion effect.



E The Feather effect further defines the blur.



F Now your second image is invisible due the Blur effect.

Note: If your units of measurement aren't in inches, you can change them in the Preferences. Select Edit > Preferences > Units & Display Performance to display the Preference dialog box. Choose Inches from the General pop-up menu, and click OK.

6. Click OK, and your image will look like **Figure E**.

To create a blurred cloud of smoke:

1. Select the transparent car with the Group Selection tool.

2. Choose Effect > Blur > Gaussian Blur to display the Gaussian Blur dialog box.
3. Set the radius to 18 pixels and click OK. Your image will look like **Figure F**.

Define the car

The original car is blurred, so we'll just need to add a clean copy of the original car to complete the technique.

To add the original car and create definition to it:

1. Drag the car symbol from the Symbols palette to the work area.
2. Place the car at the beginning of the motion trail, as shown in **Figure G**.

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3. With the car selected, choose Effect > Stylize > Outer Glow to display the Outer Glow dialog box.

4. Select Normal from the Mode pop-up menu, and then click on the color swatch to the right. From the Color Picker, choose white and click OK.

5. Set the Opacity to 75% and set the Blur to .07 in.

6. Click OK and your image will look like

Figure A. 



G Now your image has the full effect of a speeding object.



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