NEWTON Q&A: ASK THE LLAMA

Q *I have a slip in my application that edits part of my application preferences. I use GetAppPrefs to get the preferences frame, and then set a pointer to a subframe in my slip:*

```
myAppPref.viewSetupFormScript := func()
begin
   local prefs := GetAppPrefs(kAppSymbol, kDefaultPrefFrame);
   self.target := prefs.defaultNames;
   inherited:?viewSetupFormScript();
end
```

The user makes the change and I use EntryChangeXmit, but sometimes I lose the change. Any hints?

A It looks as if you're encountering an interaction between soup entries and garbage collection. In your viewSetupFormScript, you use GetAppPrefs to load the soup entry corresponding to your application preferences into the NewtonScript heap. Then you set a target slot in your preferences slip to the defaultNames slot in that preferences frame. I assume that some time later, probably in the viewQuitScript, you reload your preferences frame (with GetAppPrefs again) and call EntryChangeXmit on the frame returned by that call.

The problem occurs because you use a local variable to point to your preferences entry. Once the viewSetupFormScript is completed, this local goes away, so the preferences entry is subject to garbage collection. This may seem unintuitive since soups are where you store persistent data. However, there's a difference between the data that comprises an entry in a soup and an actual entry in the NewtonScript heap. When you request a soup entry, the data from the soup is swapped into the heap so that you can access it as a frame. The entry on the heap is a copy of the data in the soup, not the real data. Changes to that heap copy aren't written to the soup until you call EntryChangeXmit.

After your GetPrefsEntry call, the heap looks like Figure 1. Then your viewSetupFormScript returns and the `prefs` local goes away, so your heap looks like Figure 2.

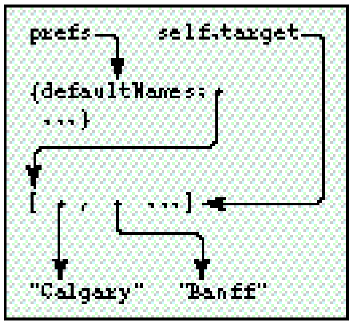


Figure 1
Heap after GetPrefsEntry

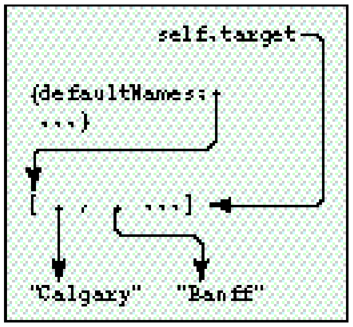
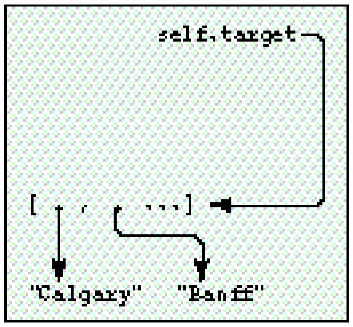


Figure 2
Heap after viewSetupFormScript

Notice how there is nothing referencing the preferences entry (Figure 2), but there is something referencing the defaultNames subobject. As far as the system is concerned, the preferences entry frame is now available for garbage collection. The next time the preferences entry is loaded in, an entire new copy of that entry is made, including the defaultNames subobject. So **self.target** points to a valid NewtonScript array that's different from the new copy of your preferences entry.

This explains why the information doesn't get updated, but not why this doesn't happen every time. It doesn't happen every time because the soup system will cache the frame representation of a requested entry. When you request an entry, the first thing the soup system does is check for a cached entry. If it exists, it's used, in which case the defaultNames subobject is the same one that **self.target** is referencing — that is, no new copy of the preferences entry is loaded into the heap.

So, what happens is that once the user finishes editing the entry, you call GetAppPrefs, which may return the cached preferences entry. If garbage collection has occurred, your target slot will point to the edited version of the defaultNames structure, but not to the defaultNames slot value from the new preferences frame. Figure 3 shows the heap after garbage collection has occurred. After your call to GetAppPrefs, you get the situation shown in Figure 4. Your local **prefs** variable points to a new heap copy of the preferences entry, but your target slot points to the old defaultNames value. The EntryChangeXmit call will affect the new copy of the soup entry, leaving it apparently unchanged.



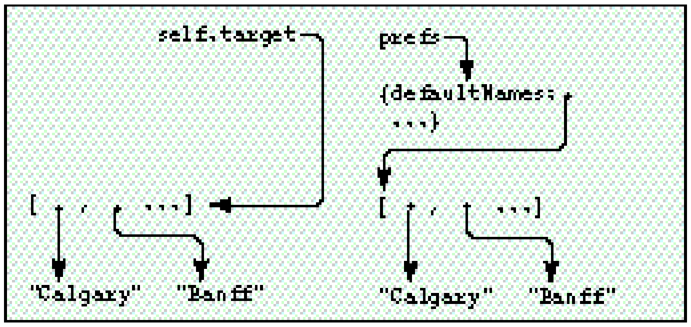


Figure 3
Heap after garbage collection

Figure 4
Heap after GetAppPrefs

There are two ways to fix this: you could put the edited defaultNames structure into the preferences frame before calling EntryChangeXmit, or you could hold a reference to the application preferences in your slip (or in your base view) for the duration of the edit. The first way is more memory efficient.

The basic lesson is that keeping around references to objects inside soup entries is a dangerous practice. The safe thing is to read in your entry, do the modifications, save the entry then NIL out the reference.

Q *I have an application that may print or fax many pages of information. I need to draw a lot of the content of those pages. I know that in 1.x viewDrawScripts, faxing needed to be fast. How about in 2.0? Are there better ways to go?*

A The main thing missing in Newton 1.x OS is a method that gets called before the fax connection is made. In Newton 2.0 OS, the formatInitScript method of your print format will be called before the connection is made. You can use this script to do time-consuming drawing and cache the results for later use.

An extension of this technique is to render all your pages into a Virtual Binary Object and then access the appropriate place in that object during printing or faxing. The advantage of this is that you save heap space, since a VBO is paged in to a system heap (not the NewtonScript heap). For some devices this is the only way to print large numbers of pages.

Q *The setup application uses some nifty embedded keyboards. I checked the beta version of the Newton Programmer's Guide for a prototype, but there doesn't appear to be one. Is this an oversight? How can I make these keyboards?*

A There are several, as yet undocumented, ROM prototypes for embedded keyboards. They will appear in the final *Newton Programmer's Guide*, but for now they're in the Newton Toolkit platform file:

- protoAlphaKeys — alphanumeric keypad
- protoNumericKeys — numeric keypad
- protoTouchtonePad — minimal phonepad
- protoPhonePad — phonepad plus punctuation and arrow keys

All of these embedded keyboards will send input to the current key view. All you have to do is draw one out in your layout and make sure the target view is the current key view. See the Newton DTS Q&A document on the Newton Developer CD for instructions on how to use an afterScript to set the proto of a view.

Q *I'm porting my code from Newton 1.x OS to Newton 2.0 OS. When I build my project using Newton Toolkit 1.6 and the 2.0 platform file, I get an error telling me that k<insertNameHere>Func is undefined. What's the problem?*

A The chances are that your 1.x code is using one of the platform file functions that either have been incorporated into ROM or are obsolete. However, developers may want to write code that works on both Newton 2.0 and 1.x devices. To enable this, we provide the old functions but we mark them as *deprecated*, which means they shouldn't be used in Newton 2.0–savvy applications, but can be used for compatibility reasons.

For example, in 1.x platform files there's a kRegisterCardSoupFunc function; in the 2.0 platform file, this is called kRegisterCardSoupDeprecatedFunc since there is a new and better way to register soups in Newton 2.0 OS. See the platform file release notes for a list of deprecated functions, protos, and so on.

Q *How are reals represented in the package format? The data field for 12.345 is represented as 0x4028B0A3D70A3D71, for example.*

A NewtonScript uses the Apple SANE **double** format (basically the IEEE format) for floating-point numbers. These are implemented as 8-byte binary objects of class **real** and contain a sign bit, 11 bits of biased exponent, and 52 bits of fraction.

0x4028B0A3D70A3D71 is the binary data (8 bytes) of the SANE representation of 12.345. It's the same data that's used to hold the number on the Newton itself.

Q *I would like to add a separator line followed by some new application specific actions. I proceeded to register a frame with the title as the symbol pickSeparator. It worked, except that the separator was selectable. All I'm trying to achieve is an eye-pleasing separation between the system actions and my actions. I also tried returning in the GetTitle routine a frame with*

```
{item: 'pickSeparator, pickable: nil}
```

but that resulted in a blank entry. Is there a way to do what I'm trying to do — that is, to have a pickSeparator that isn't selectable in the action button?

A In the routeScripts array, you can use a nil value instead of a frame. That will add another pickSeparator at that position in the routeScripts. Note that the system will fill in the separator between the items that are routing transports (like Print) and the items that are actions (such as Delete). If you need to add this separator dynamically, you can provide your own GetRouteScripts method that dynamically returns the routeScripts frame.

That said, please check the latest *Newton 2.0 User Interface Guidelines* to make sure that you're putting a separator in a valid spot.

Q *I'm profiling my application to see why it takes so long to open. However, of the time it takes to open, only a small percentage is spent in my code. I'm measuring from the start of the viewSetupFormScript to the end of the viewSetupDoneScript in my base view.*

A There are a few things you can do. The first is to make sure you're profiling system functions to see if that's where the time is going. It may be that you're doing things in your startup process that would be better done at a later time.

You may also be running into low-memory conditions. Run the HeapShow utility that comes with Newton Toolkit and look at the frames heap and free system space (handles and pointers). You can do this in combination with NS Debug Tools to step through your code and track memory usage. Note that the Newton Toolkit inspector will use a fair bit of system space, so you may want to get a baseline memory usage without the inspector connected.

Q *How do I reset a protoTextList so that when I change the listItems and redisplay, the display starts at the first item again? Right now if I've scrolled the text list and then I reset it, the top item is wrong.*

A The documentation mentions a SetupList method that you call when initializing the view. However, this is not enough if you're changing the listItems after you've opened the textList. Since the current implementation of textList scrolls by offsetting the origin, you also need to reset the origin.

Here's a method that you can add to your own protoTextList that will add a text item and redraw the list correctly:

```
myProtoTextList.AddItem := func()
begin
   // make sure listItems is an array
   if NOT listItems then
      listItems := [];

   local newItem := GetRandomWord(5, 10);
   // insert in sorted order for strings
   BInsert(listItems, newItem, '|Str<|, nil, nil);

   // redisplay based on new data
   // this will reset the list to the top item
   :SetOrigin(0, 0);
   :SetupList();
   :RedoChildren();
end;
```

Q *Can you write a funny Q&A ?*

A Yes.

Q *I'm having two problems with a protoPicker view. First, when I open a protoPicker view (whose vFloating flag I haven't turned off) it's obscured by a textButton in the main view. I can't figure out why it doesn't float over this plain vanilla textButton.*

Also, I can't select some of the items in the picker. The inaccessible items appear last in the list, from the portion of the picker view that extends beyond the picker's parent view or the slip's main view.

The only thing I can see unusual here is that the protoPicker view is not a sibling of the textButton. The view hierarchy looks like this:

```
slipMainView
```

```
clusterView
   protoPicker
textButton
```

Can you help?

A It looks like the protoPicker is being opened as a child of the clusterView. What this means is that the active (tapable) area of the protoPicker will be clipped to the bounds of the clusterView.

It also sounds like the clipping viewFlag of the clusterView is not set. That allows the protoPicker to be drawn outside of it's parent, so you may think it is clickable even when it is not.

There are 3 possible solutions:

- Resize the protoPicker so that it is no larger than the clusterView.
- Make the protoPicker a child of a view higher up in the heirarchy (e.g., the slipMainView)
- If your protoPicker is larger than the application base view, use BuildContext to attach it to the root view

The llama is
the unofficial mascot of the Developer Technical Support group in Apple’s Newton Systems Group. Send your Newton-related questions to dr.llama@applelink.apple.com (AppleLink DR.LLAMA). The first time we use a question from you, we’ll send you a T-shirt.

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If you need more answers,
check out http://dev.info.apple.com/newton on the World Wide Web or Newton Developer Info on AppleLink.