Paper 144-26

Getting Data From SAS To Your Palm
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ABSTRACT

A PalmOS Personal Digital Assistant (PDA), such as the Palm III, is a compact device for viewing and entering data. This paper provides an overview of what these devices can do, and suggests a few methods for getting data into a Palm using SAS as an intermediate step. This paper does not address wireless devices, and does not provide detailed SAS code.

INTRODUCTION

PDA's have been working their way into the popular culture, with appearances in comic strips and on TV shows. The most popular operating system for PDA's is PalmOS. It was first introduced by Palm, Inc. in 1996 on the Palm Pilot, and is now available on devices manufactured by Palm (currently a part of 3COM), Handspring (started by the original founders of Palm), Sony, and other companies. I have a Visor Deluxe from Handspring, with 8M of memory; that doesn't sound like much to a Windows user, but the PalmOS manages to squeeze quite a bit into a small space (everything on the Palm is kept in memory – there's no hard drive). It has a black and green screen. Other, more expensive, models have color screens. I use the term "Palm" as a generic name for all these devices.

The distinguishing characteristics of Palm devices are a simple interface, long battery life, and adaptability. By design, they're not miniature notebook computers. Data entry is done using a simplified script called Graffiti, or by tapping on the screen with a stylus.

THE PALM HARDWARE

Here's what a typical Palm looks like (this and the following screen captures are from the Palm Emulator running under Windows):
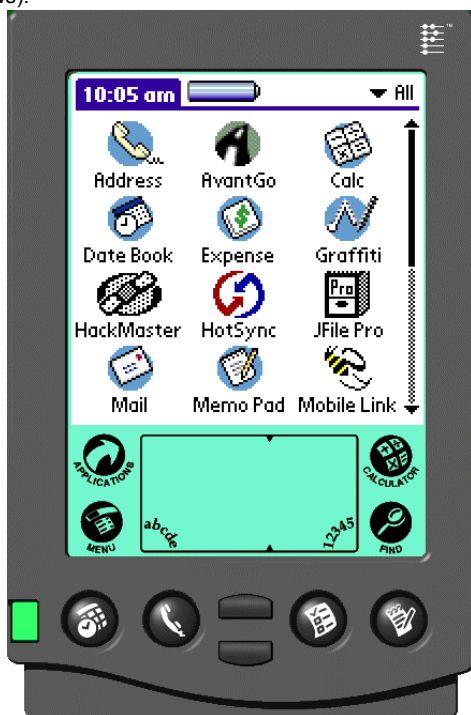
THE APPLICATIONS AREA

The area at the top is used by Palm applications for information display and entry. The application shown here is the Launcher, which shows an icon for each available program. You would start an application by tapping on its icon with a stylus or your finger. At the top left is the menu bar. At the top right is a category selector (the thing in the middle is a battery life indicator). Both the menu bar and the category selector are optional, but many applications use them. The area below in white is available for use by the application.

THE GRAFFITI AREA

The grey area below that is the Graffiti area, where you write characters (some applications also let you write in the white area). To the sides are four software buttons, which are defined by default to bring up the Launcher, the current program's menu, the Calculator, and the Find application.

The Graffiti area is divided into two areas, indicated by little dimples. The larger area to the left is used to enter letters, and the smaller area to the right is used to enter numbers.

Letters and numbers are entered using a simplified script. I have fairly bad handwriting, so I was worried about this, but it turns out to be pretty easy – nothing like the Newton jokes in Doonesbury a while back.

As an example, here's how I would write my first name:
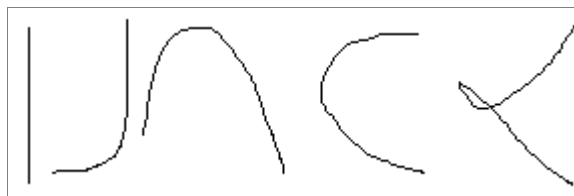
Not especially neat, but Graffiti recognizes it. Most of the letters are just like regular letters with some of the strokes omitted. (The vertical line at the left tells Graffiti that the next letter is a capital.)

Several of the more difficult letters can be written more than one way. Graffiti has a problem recognizing how I write the standard form of the letter D (at the far left below), but knows the alternative form (at the center left).
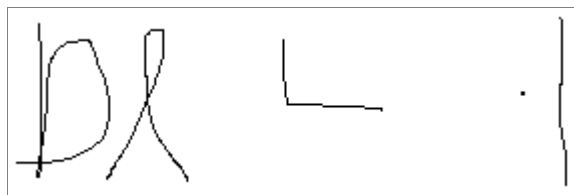
Numbers are drawn in the right part of the Graffiti area; the number 4 is shown in the middle above. Punctuation is written with a tap or a slash followed by another stroke; the way to write a single quote mark is shown at the right.

HARDWARE BUTTONS

There are seven hardware buttons along the bottom front of the device. From left to right, they are the On/Off button (device-specific), the Date Book button, the Address Book button, the Up and Down buttons, the To Do button, and Memo Pad button.

The four application buttons can be reassigned, and pressing one of them will turn on the device if it's turned off.

THE BUILT-IN APPLICATIONS

The Palm comes with several built-in applications. The most commonly used are probably Date Book, Address Book, and Memo Pad.
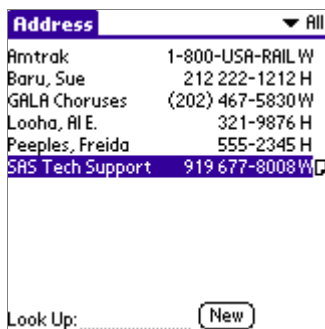
DATE BOOK

The Date Book is a calendar. Its most basic usage is to show a daily calendar (this and later screen captures will show only the application area):
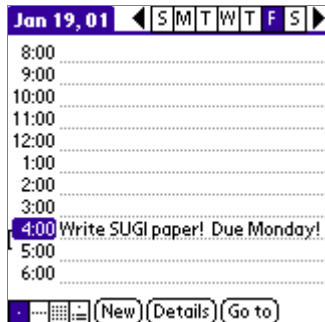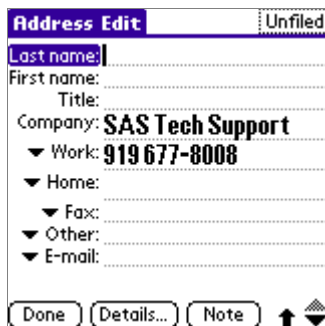

There are also weekly and monthly views.

ADDRESS BOOK

The Address Book is just what it sounds like, an address book. It has a basic listing:

with many built-in fields:

You can enter your own free-form text in the Note area:


There are four ways to get data into the Address Book:

1. You can enter information directly into the Palm, or
2. You can enter information into the Palm Desktop running on Windows or MacOS (more about that later), or
3. You can create an archive file and import it into the desktop. (more about that later as well), or
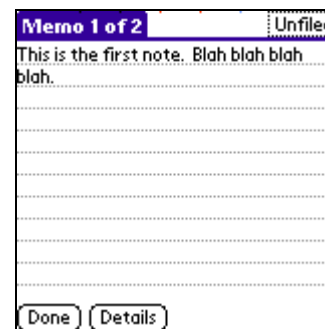4. You can write a Palm program to add data.

MEMO PAD

The Memo Pad allows entry of free-form text. Each memo can be as long as 8000 bytes or so. It's probably the most boring of the Palm apps:

You can see a list of all memos:
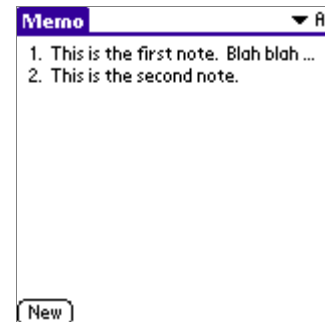
or you can view a single memo:

The same four entry methods are available as for Date Book.

Other built-in applications are To Do, Calculator, Expense, and Mail.

THE DESKTOP AND HOTSYNC

Very few Palms are standalone. Most are attached, at least occasionally, to a desktop computer. The Palm desktop apps give you several capabilities:

* The ability to view or edit data in the built-in apps.
* The ability to install new applications and data.
* The ability to back up your data and programs, as insurance against the time when your batteries run down or the PalmOS suffers a fatal crash.
* The ability to synchronize data with third party applications through conduits.

THE DESKTOP
Here's what the desktop looks like, in a greatly reduced view
(it fills most of an 800 x 600 screen):
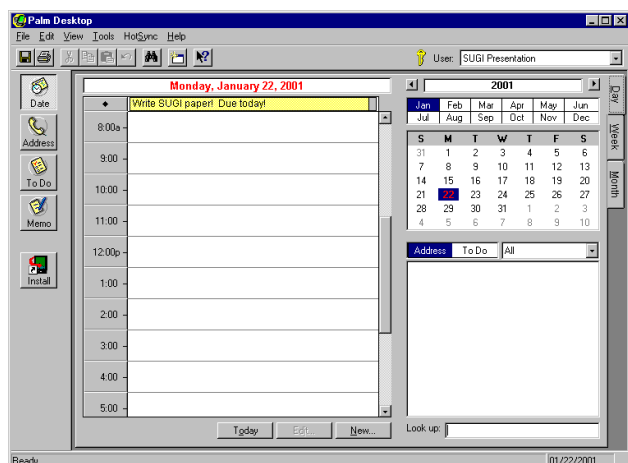
This view of the Palm Desktop shows the Date Book. You can
also bring the Address Book, To Do list, or Memo Pad to the
front. You can export data to a proprietary format, or import it
from a previously created file. You can also select a username if
you have more than one Palm user on a single PC.

The Desktop runs under Windows. An older version is available
for Macintosh computers. Several groups claim to distribute
desktop software for Linux.

HOTSYNC
HotSync is the term used for the process of synchronizing data
between the Palm and the Desktop. In its simplest form, a
HotSync copies information that you've entered on the Palm to
the desktop, making it available for viewing and simultaneously
creating a backup.

The process becomes more complicated if you've updated
records on both the desktop and the Palm. If you've added
records in both places, the new desktop records are copied to the
Palm, and the new Palm records are copied to the desktop. If
you've changed a record in both places, HotSync generally gives
up and leaves a copy of both records in both places, leaving it up
to you to figure out what to do.

HotSync uses conduits, which are programs called during by
HotSync to synchronize data. The conduit might choose to do
something quite simple, such as copy the records back and forth,
or it might do something fairly complex (AvantGo, discussed
below, has a complicated conduit).

The Palm is connected to the desktop via a cradle, which plugs
into a serial or USB port (synching through an infrared port or
modem is also possible). When you press a button on the
cradle, the HotSync process starts:
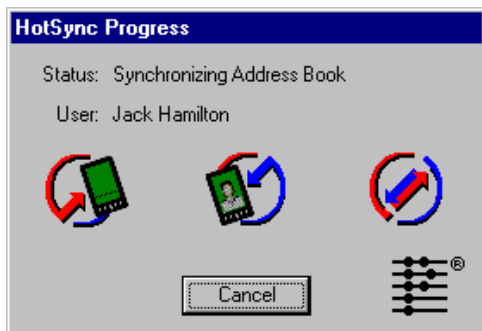
A simple HotSync might take only a few seconds; a complicated
HotSync which uses third party conduits and reads external data
might take several minutes (my HotSync takes 30 seconds to 10
minutes, depending on the work to be done).

The HotSync is also used to install new applications on the Palm;
typically apps are distributed on diskette or CD-ROM or via the
web.

THIRD PARTY APPLICATIONS
Palms are popular, and the PalmOS has a powerful Application
Programming Interface. Several free or low cost compilers are
available, and Palm Inc. supports third party developers well. As
a result of all these things, there are literally thousands of free or
low cost applications and data files available. A good source for
both freeware and shareware is `<www.palmgear.com>`. If you
try shareware and keep it, please pay the fee. I currently have 14
paid shareware programs on my Handspring, and another 14 free
programs.

AVANTGO
AvantGo is a web browser. A tiny web browser, but a browser
nevertheless. If you can live with its restrictions, it's the easiest
way to get frequently changing data from SAS to a Palm.

Here's a sample page from the New York Times web site:

As you can see, it supports two of the most important features of
browsers – images and links. It also supports tables.

AvantGo lets you browse any web page that meets two criteria:

- It must be on the public web, so a page stored behind a
corporate firewall is not accessible.
- The page must fit on a 160x160 display (with scroll bars), so
pages that rely on large graphics, frames, JavaScript, or
other gimmicks (such as most sas.com pages) can't be
read. For best results, pages should be designed with the
possibility of a small display in mind.

In addition, interactive forms aren't completely supported unless
you're on a wireless Palm, but some pages do know how to store
information until the next HotSync.

As you might imagine, the AvantGo conduit is complex – it reads
the Palm to see if there are any stored requests, or changes to
your list of sites, and it opens an HTTP connection to the
AvantGo web site to see if any of the sites you selected have
changed since the last time you HotSync'ed. If they have, the
website does a conversion between HTML and AvantGo's
internal format. HotSync then has to copy new files to the Palm,
delete old files, and inform the web site what it's done.

AvantGo is currently free. I believe they expect to earn their
revenue by selling advertising and server software. If you buy
their server software, you can view pages behind your internal
firewall. AvantGo servers are aimed at the wireless and MS
Exchange markets, but using pages created by SAS/Intrnet or the
Output Delivery System will also work.

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JFILE PRO

JFile Pro is a simple database program. It lets you create simple tables with numeric, string, or date fields. A date selector dialog can be used for dates, and a list selection dialog can be used for strings. When you open it, you are presented with a list of table names. When you click on a table, you will see a list of records:

You can then click on a record to view or edit it:

You can sort and filter records. Data are entered data directly into this application, or by using a Windows program. You can also add data using Microsoft Access.

Several other Palm database programs are available, including ThinkDB and HandDBase. Each offers its own advantages and disadvantages; for example, HanDBase handles linked records and includes a free Mac desktop program.

TEALDOC

TealDoc is one of several programs which displays standard Palm documents (sometimes called the AportisDoc format). It allows bold facing, large fonts, and embedded images:

Documents can be written directly on the Palm using a separate application, or they can be created on the desktop and converted.

There are several other document display applications; two are iSilo and SmartDoc.

TEALINFO

TealInfo allows you to create sets of information, called folios, which are displayed on the screen in lists or textboxes. You can select subsets of information using list boxes or dropdowns:

TealInfo folios can look very professional, and you can hold a lot of data thanks to the use of compression, but it is not flexible – all the possible combinations of input must be defined in advance also with their results. Folios are read-only on the Palm.

Folios are defined by structured text files which are run through a converter running under Windows. Despite their weaknesses, TealInfo folios are good candidates for creation by SAS, which is good at tasks like figuring out all combinations of a set of variables.

PLANETARIUM

This one has no business use that I can think of, and isn't susceptible to data import from SAS, but I wanted to show an application that does lots of calculations and produces interesting graphics:
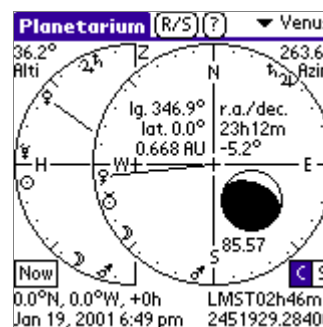
OTHER APPLICATIONS

I've described only a tiny fraction of the third-party applications written for the Palm platform. At least 5,000 different apps and databases are available now, and new ones are written every day.

Just to give you an idea: There's a symbolic math processor called MathPad. There are dozens of calculators, some emulating existing calculators, others tailorable to your own needs. IBM has released DB2 Everyplace for the Palm; it supports SQL and indexing. Oracle has released a similar product. There are at least half a dozen spreadsheet apps. There are many good solitaire games. You can add Tiger Woods Golf to your Handspring.

And finally, although I don't know of any specific plans for a Palm version of the SAS viewer, it's certainly doable. A viewer for a single predefined SAS table is almost trivial, and I'm fairly confident that SAS Institute does not plan to overlook this market.

FROM SAS TO YOUR PALM

Now that you have an idea what's available on the Palm, how can you get your data there?

There are two basic methods, which have variations (not all of which will be covered).

- You can put your data into a desktop application (copy-and-paste or type), whence it will be copied to the Palm during the next HotSync, or

- You can put the data in a public place where a Palm application, using a conduit on the desktop, knows to look.

FROM THE DESKTOP

THE LOW-TECH WAY – COPY AND PASTE

The low-tech way is simple. You wouldn't want to use it for extensive data transfer, but it's good for a one-time copy for one user: Get the data into text form, and just paste it into the Memo Pad on the desktop. After the next HotSync it will be in your Palm.

What if you have a memo, set of addresses, or group of appointments you want to send to a number of people?

Again, you can do this with copy and paste. This time, though, create a new userid on the desktop, and enter your information. Then use File | Export to create a export file which you can distribute to your users, who can then import it. After the next HotSync, the new information will be in their Palms.

I'm not going to show an example of these solutions. They work, but they're not pretty. Just keep them in mind if you need to get something out really fast.

DISTRIBUTION THROUGH APPLICATION DATA FILES

Another method of distributing information is through application data files. JFile, TealDoc, and TealInfo store information in Palm data files (called PDB's). Those three applications (and many others) have desktop converters (Windows or DOS programs) which take a plain text file and convert it to a PDB.

Part of the text file required to create a simple telephone book in TealInfo is shown below; it was created by a SAS program running under OpenVMS. Ordinarily it would read names and numbers from an internal web page, but I used dummy names for this example:

```
TRES locDG
    TEXT
        "PEEPLES, FRIEDA"
        "    (630) 555-1212"
        "    ACCT"
TRES locWSAC
    TEXT
        "LOOHA, AL E."
        "    (916) 374-3833"
        "    METRICS"
```

The text file for this particular app requires a fair amount of text manipulation – sorting, creating a drop-down entry for each separate location, creating and keeping track of unique ID's, massaging some fields which aren't always correct on the web page, and so forth. SAS, with its extensive data manipulation capabilities, is well suited for the task.

When you run the converter program, MKTLINFO.EXE, against the text file created by SAS, it will create a PDB which is then installed on the desktop and HotSync'ed to the Palm.

One page of the resulting directory would look like this:
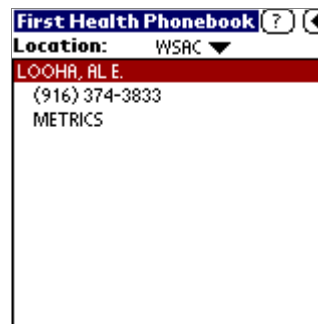
With JFile, you have another option besides creating a text input file. An accessory program, JFTrans, lets you interchange data between an Access file (MDB) and a JFile PDB. Since SAS (with the appropriate options) can read and write MDB's, this will be a better solution in some cases.

The special format used by the TealDoc converter is similar to HTML; if you are experienced with writing HTML using data step code, writing TealDoc input will be easy. As shown in the example on the previous page, TealDoc allows you to display large text, bold text, and horizontal rules. It also lets you create bookmarks to make it easier to find sections of the document.

Distribution of application PDB's is somewhat easier than distribution of import files. You can send a PDB through email or put it on a web site, and the recipient simply clicks on the file name to install it.

DISTRIBUTION THROUGH THE WEB

Several Palm applications allow you to display data on web pages. AvantGo is the best known of these applications. AvantGo is designed for wireless devices such as the Palm VII, but many of its features work on devices which can talk to the world only during a HotSync. If you are careful about the features you include on your pages, the same HTML can be used by both regular browsers and AvantGo.

Another approach is to maintain duplicate sets of pages, one designed for general use and one designed for AvantGo.

A third approach is to dynamically generate different output depending on the browser. If you are creating your HTML with SAS/Intrnet, you can check the value of the _HTUA macro variable.

CUSTOM APPLICATIONS

All of the solutions above have a common disadvantage: you're restricted to doing whatever the original application designer allowed. Perhaps that's all you need – the applications listed above cover a broad spectrum of needs. But perhaps you really do need the ability to do more – perhaps you want to enter some numbers, have SAS do some calculations, and return the results. You can do that as well.

Several programming options are available for the Palm. Large commercial applications have historically been written in C. I consider that to be an undesirable choice, and happily there are several alternatives.

I've been using CASL (Compact Applications Solution Language), which is, broadly speaking, a variant of BASIC. Another possibility is AppForge, an add-on to Microsoft Visual Basic. The beta versions of both products provide ODBC access.

Once you have ODBC, you can read SAS tables and run SQL-based programs. By the time SUGI arrives I will have had the opportunity to create some examples. Both products allow read/write access to built-in databases such as the calendar.

REFERENCES

PALM MANUFACTURERS

```
<www.palm.com>

<www.handspring.com>

<www.sonystyle.com/
   flashmovies/clie_redirect.html>

<www.symbol.com>
```

SOFTWARE DISTRIBUTORS

```
<www.palmgear.com>
<www.handango.com>
```

THIRD PARTY APPLICATIONS

AvantGo
```
<www.avantgo.com>
```

Databases
```
<www.land-j.com>
<www.thinkdb.com>
<www.handbase.com>
```

Document Readers
```
<www.tealpoint.com>
<www.isilo.com>
<www.cesinc.com>
```

Other Applications
```
<www.tealpoint.com>
<www.aho.ch/pilotplanets>
```

Programming Solutions
```
<www.caslsoft.com>
<www.appforge.com>
```

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