
Technical Report



**Calendar Entry Statistics
for Computer Calendar Users**

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ABSTRACT

Personal Digital Assistants (PDAs) are small computing devices that support a user's personal organization activities. Because they are small, PDAs do not have as much memory or computing power as a computer. The purpose of this study was to determine the values of calendar entry statistics for computer calendar users. These statistics (number of entries per day, characters per line, lines per entry, and characters per entry) can help architects of PDA calendar programs design their programs to simultaneously (1) satisfy their users' requirements and (2) take up the least possible amount of memory in the PDA.

Introduction

Computer software designers must meet multiple objectives when they design a program. For example, they must both satisfy their users' requirements and write a program that will work within the constraints of the computing device. The more constrained the device, the greater the challenge.

Personal Digital Assistants (PDAs) are small computing devices that support a user's personal organization activities. One important software application for such activities is a calendar program. The purpose of this study was to measure the characteristics of meeting notices in a computer calendar program. These statistics (number of entries per day, characters per line, lines per entry, and characters per entry) can help the architects of PDA calendar programs design their programs to simultaneously (1) satisfy their users' requirements and (2) take up the least possible amount of memory in the PDA.

Method

Virtually all IBM employees have electronic mail addresses on a mainframe computer. All IBM employees who have an electronic mail address also have an electronic calendar, but they do not necessarily use their electronic calendar unless they are managers. I collected an initial random sample of 40 IBM Boca Raton employees' computer calendar entries for the week ending April 30, 1993. The process of viewing an employee's calendar also indicates whether the employee is a manager or a non-manager. The initial sample contained only four managers, so I collected another eight random samples from IBM managers for the same week. The key word "Requester:" in a calendar entry indicates that the user moved the data in the entry automatically from an electronic meeting notice rather than typing the contents of the entry. The sample of 48 users produced 333 calendar entries. The structure of the resulting database allowed analysis, as a function of manager/non-manager and manual/automatic calendar entry, of:

- Number of calendar entries per day,
- Number of lines per entry,
- Number of characters per line, and
- Number of characters per entry.

Results

Proportion of Managers

This estimate of the proportion of managers used the initial sample of 40 participants. That sample included four (10%) managers. The 90% binomial confidence interval for this percentage ranged from 4 to 21%.

Proportion of Computer Calendar Users

Because managers maintain their calendars on the mainframe computer system, but non-managers may or may not, it is possible that the proportion of computer calendar users is a function of whether a user is a manager. Table 1 shows the distribution of computer calendar users as a function of employee type (manager or non-manager). A Fisher test showed that the manager and non-manager proportions of computer calendar use were significantly different ($p=.002$). One hundred percent of managers used the computer calendar (90% confidence interval ranging from 78 to 100%), and 53% of non-managers used the computer calendar (90% confidence interval ranging from 38 to 67%).

Table 1. Calendar Use as a Function of Employee Type

	<u>Manager</u>	<u>Non-Manager</u>	<u>Total</u>
Uses calendar:	12	19	31
Doesn't use calendar:	0	17	17
Total:	12	36	48

Proportion of Calendar Users Who Used Automatic Calendar Entry

The electronic mail system allows users to distribute meeting notices that the recipients can automatically send to their calendars. These meeting notices always contain the key word "Requester:". Of the 31 calendar users, 74% had at least one calendar entry that they had automatically placed in their calendar from their electronic mail meeting notice. A 90% confidence interval on this percentage ranged from 58 to 87%. Table 2 shows the distribution of this proportion as a function of employment type (manager or non-manager). These proportions were not significantly different (Fisher test, $p=.64$).

Table 2. Automatic Calendar Entry as a Function of Employee Type

	<u>Manager</u>	<u>Non-Manager</u>	<u>Total</u>
Uses automatic entry:	9	14	23
Doesn't use automatic entry:	3	5	8
Total:	12	19	31

Number of Calendar Entries

The average number of calendar entries per day differed as a function of employee type (manager or non-manager) ($F(1,145)=48.1, p<.001$). Table 3 shows the average, the standard deviation, and estimated 95th and 99th percentiles for the number of calendar entries per day as a function of employee type. (The mean plus two standard deviations estimates the 95th percentile, and the mean plus three standard deviations estimates the 99th percentile.)

Table 3. Number of Daily Calendar Entries as a Function of Employee Type

<u>Employee Type</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Percentile</u>	
			<u>95th</u>	<u>99th</u>
Manager	3.6	2.75	9.1	11.9
Non-Manager	1.2	1.44	4.1	5.5

Entry Analyses

The database contained a total of 333 entries, with information about average line length, the number of lines per entry, and the number of characters per entry. Two variables that could influence these entry characteristics were employee type (manager or non-manager) and entry method (manual or automatic). Table 4 shows the results of the entry analyses, divided into two sections (employee type and entry method). If, for a

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given measurement, a t-test for a variable was significant, then the table includes statistics as a function of that variable. Otherwise, the table provides overall statistics. (The mean plus two standard deviations estimates the 95th percentile, and the mean plus three standard deviations estimates the 99th percentile.)

Table 4. Entry Statistics as a Function of Employee Type and Entry Method

Employee Type (Manager or Non-Manager)

<u>Measurement</u>	<u>t-test Results</u>	Average	<u>Mean</u>	<u>Standard Deviation</u>	<u>Percentile</u>	
		Based on			95th	99th
Line length	t(321)=2.97, p=.003	Manager Nonmgr	21.0 25.0	12.0 11.0	45.0 47.0	57.0 58.0
Number of entry lines	t(331)=0.62, p=.54	Overall	3.0	2.0	7.0	9.0
Characters per entry	t(331)=1.24, p=.22	Overall	76.0	88.5	253.0	341.5

Entry Method (Automatic or Manual)

<u>Measurement</u>	<u>t-test Results</u>	Average	<u>Mean</u>	<u>Standard Deviation</u>	<u>Percentile</u>	
		Based on			95th	99th
Line length	t(321)=8.88, p<.0001	Automatic Manual	29.8 18.7	8.2 11.4	46.2 41.5	54.4 52.9
Number of entry lines	t(331)=16.3, p<.0001	Automatic Manual	4.9 2.1	2.0 1.2	8.9 4.5	10.9 5.7
Characters per entry	t(331)=15.4, p<.0001	Automatic Manual	154.0 39.0	101.0 34.0	356.0 107.0	457.0 141.0

Discussion

This report should be useful to programmers who design electronic calendar applications. The results show that employee type (manager or non-manager) and entry method (manual or automatic) affect the characteristics of computer calendar entries. Managers had more calendar entries per day and slightly more characters per line than non-managers. Automatic calendar entries had slightly longer lines and substantially more lines and characters per entry than manual entries.

This computer calendar had no constraints on entry length. Also, users had full-size displays and keyboards for viewing and entering calendar data. Therefore, the estimates of computer calendar statistics reflect this type of computer use. Personal digital assistants (PDAs) have reduced-size displays and keyboards relative to computer systems, so users who make entries manually should tend to have smaller entries. On the other hand, if the PDA allowed users to update the PDA calendar from a personal computer, the PDA calendar application would need to be able to handle entries similar to manual entries for a computer calendar. Furthermore, if the PDA allowed users to place meeting notices into the calendar automatically, the PDA calendar application would need to be able to handle entries similar to automatic entries for a computer calendar.

Users can make manual calendar entries short because they usually know what a meeting is about, but need a short reminder. A user who sends a meeting notice to others must write enough to express the purpose of the meeting to attendees who may know nothing about the meeting. A useful area of future research for automatic PDA calendar entry would be intelligent conversion or compression of a meeting notice to a calendar entry. There are several approaches that might work, either alone or in combination. For example:

As a default, strip the vowels from words. Most words should be clear from the context. (Mst wrds shld b clr frm th cntxt.) Develop a lexicon of the common words that become unrecognizable without vowels (such as "you" becoming "y") and develop a routine to either leave them intact or replace them with a shorter, but still recognizable version (such as "you" becoming "u").

Put a Short Reminder or Subject field in the meeting notice form. Offer users the choice of setting their automatic calendar entry function to capture either the entire meeting notice or the essentials (time, place, requester, and short reminder).

If a meeting notice does not have a reminder field, then let the user mark a reminder phrase. The automatic calendar entry function would then transfer the essential information to the calendar, substituting the reminder phrase for the body of the notice.