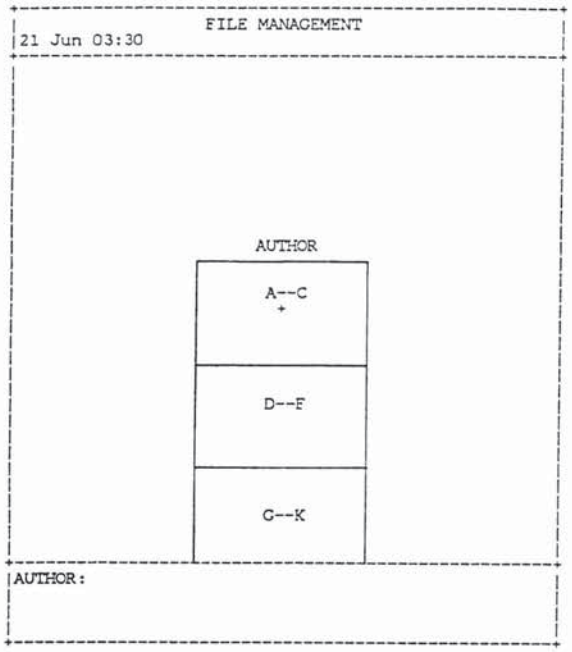
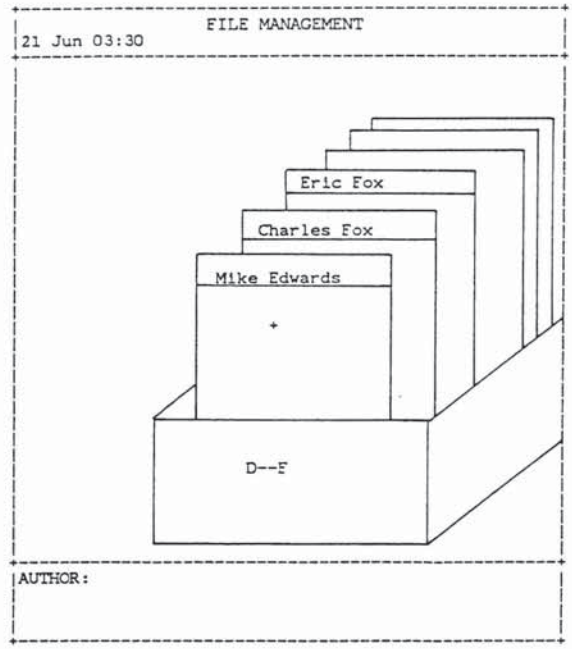


(b) a user may browse through the drawers of a filing cabinet to search for a file



(c) activating a drawer will cause the drawer to open up and display an array of indexes

(d) the user can pull the file corresponding to the selected index

Figure 6 The file retrieval process.

a file by other classifications such as title, date, and reference number. If a user wants to retrieve a file by a particular string of text used in the file, he must specify the search argument after he activates the string-oriented index filing cabinet in Figure 6(a).

In addition to the retrieval capability, the file management facility allows a user to store a document into several different filing cabinets corresponding to the set of previously created indexes. An instance or all instances of an ib object can be filed at one time. To file an instance of an ib object, the user activates the associated ib icon, locates the desired instance, and presses the function key "file management". The file manager will respond by displaying several filing cabinets on the screen. The user may then file the document according to the existing classifications and/or specify other classification(s) by which the document is to be filed. If an ib object has only one instance or all its instances are to be filed as one entity, the user depresses the "file management" button after the cursor is positioned onto the associated ib icon.

8.2 Meeting scheduler

Scheduling meetings involves finding a meeting time convenient for all participants as well as determining the availability of a meeting place. In the proposed user interface, meetings are arranged by the meeting scheduler, one of the functions provided by the time management facility.

Upon pressing the key marked "time management", a list of functions plus three monthly calendars are shown on the display screen as exhibited in Figure 7. The three calendars on the left side of the screen show the past, current, next month, respectively.

Scheduling meetings involves the use of an electronic appointment book, which is used to record the daily appointments schedule of an office employee (see Figure 8). The notion of an electronic appointment book is drawn from the PCAL (Personal CALendar) system described in [11]. New events can be inserted, and scheduled occasions may be deleted or updated on the electronic appointment book. An office worker normally works eight hours per day, and these eight hours are divided into sixteen half-hour slots on the electronic appointment book.

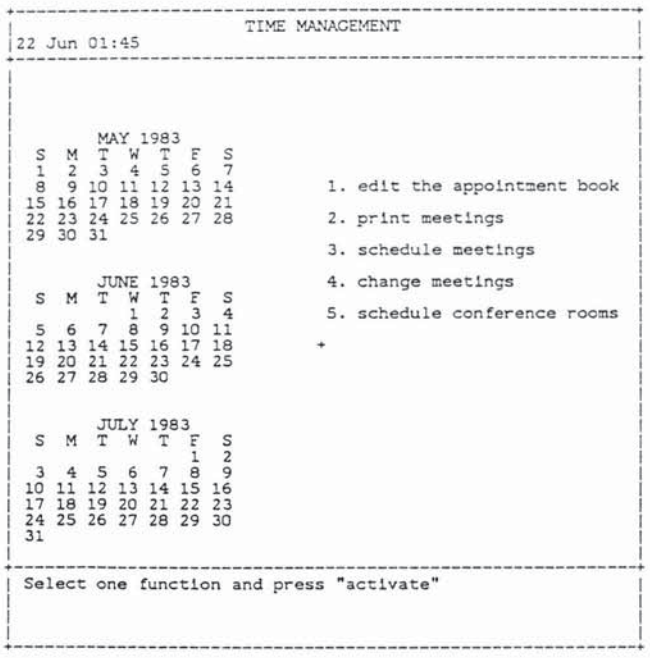


Figure 7 The time management facility.

Dates on the current- and the next-month calendars are displayed in different colors to indicate the number of occupied slots on that day. Dates with 0-5, 6-10, and 11-16 slots booked are shown in green, yellow, and red, respectively. Viewing these calendars, a user has a brief idea of how heavily he is engaged in these two months.

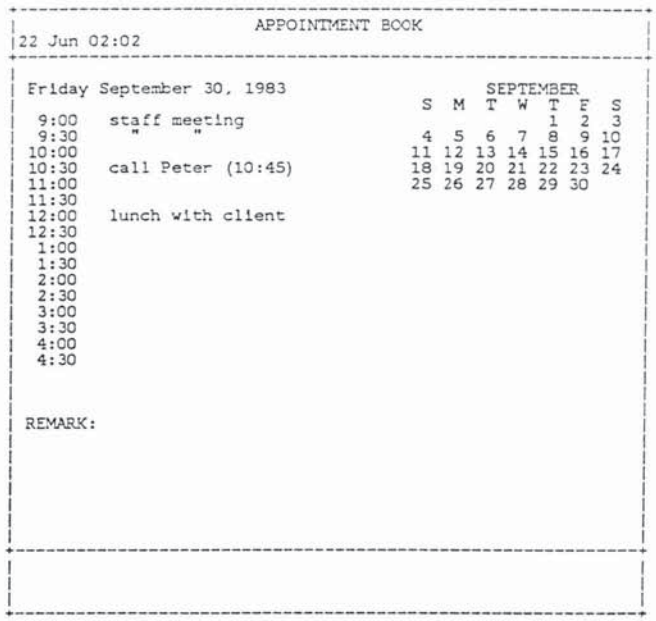
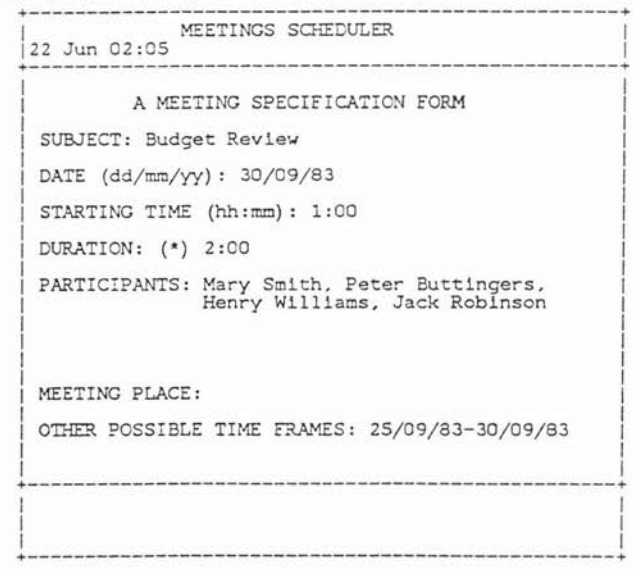


Figure 8 A page of an electronic appointment book.

To schedule a meeting, a user selects the appropriate choice in Figure 7 after invoking the time management facility. The system then displays an electronic image of a "Meeting Specification Form", which is shown in Figure 9. The user may specify only the duration of the meeting and its participants. The other items on the form will assume their default values if they are not specified.



(*) the user checks an agenda before he fills in the duration of the meeting.

Figure 9 A meeting specification form.

As a default, the value of subject will be given as "Meeting". When the date and starting time of the meeting are not specified, the system will search for the earliest available period, starting from nine o'clock the next day, that suits both the duration of the meeting and all its participants. If the user does not specify the meeting place, any one of the conference rooms that is available at the time of the meeting will be reserved.

In this example, the user indicates that he wants a meeting concerning a budget review to be scheduled at 1p.m. on September 30, 1983. In estimating the duration of the meeting, he wants to check the agenda of the latest session of the budget review. Therefore, he presses the button "hold"; the facility of time management is suspended, and the system returns to the main desktop. The user then invokes the file management facility to retrieve the agenda of the last budget-review meeting.

While examining the agenda, the user wants to retrieve some budgetary data from an ib object. He presses the key "hold" again and the file management facility is now suspended. All the suspended facilities will be listed in the AI area. After examining the required information from the ib object, the user returns to the main desktop by pressing the "done" key. Depressing the key "resume" will release the file management facility from suspension and restore the display at the point where the user last left off. The message in the AI area will also be revised accordingly.

When the user finishes estimating the duration of the meeting, he presses the key "done" to complete the retrieval process of the file management facility. Returned to the main desktop, the user may still activate any objects for other purposes. The reminding message will stay in the AI area until all the suspended facilities are released. When the user presses the key "resume" and returns to the facility of time management, the screen is restored as shown in Figure 9.

Upon the completion of the meeting specification form, the meetings scheduler checks the participants' electronic appointment books to see if they are free for the meeting. If all participants are available and a conference room is accessible, the scheduler will enter the engagement onto the host's and participant's appointment books and reserve the conference room automatically. The conference room schedule will also be updated accordingly.

In case of a time conflict, the meeting scheduler will print a list of several time frames (within the time period requested by the host) that is convenient for all meeting participants. The user then selects one of the possible choices.

9. Conclusion

The design of the proposed prototype was accomplished in several stages. A spatial-oriented user's conceptual model was established first; objects in the user interface were then defined. The interface involved two types of objects, namely functional objects and information objects. The representation of information objects was in the form of graphical symbols, the icons. The user interface provided a set of primitive icons, from which user-generated graphical images could be derived. In order to escape the physical-size constraints of the terminal screen, the prototype design employed the framework of a virtual display and a hierarchical structure of information spaces. The design also included the notion of working sheets that are created and manipulated within the virtual terminal workspace. Finally, a set of basic functional operations for manipulating icons was briefly discussed.

The effectiveness of the proposed prototype was tested in part through the specification of detailed scenarios for three applications in [5]. Two of these applications, a file manager and meeting scheduler, were outlined in this paper.

Future work involves the completion of a prototype implementation and the testing of the effectiveness of this prototype on a realistic user community. A viable prototype implementation strategy that we are currently investigating is to build an information-space model on top of an existing integrated OIS software packaged such as Knowledge Man [6].

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