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(54) **METHOD AND APPARATUS FOR DYNAMICALLY PROCESSING EVENTS BASED ON AUTOMATIC DETECTION OF TIME CONFLICTS**

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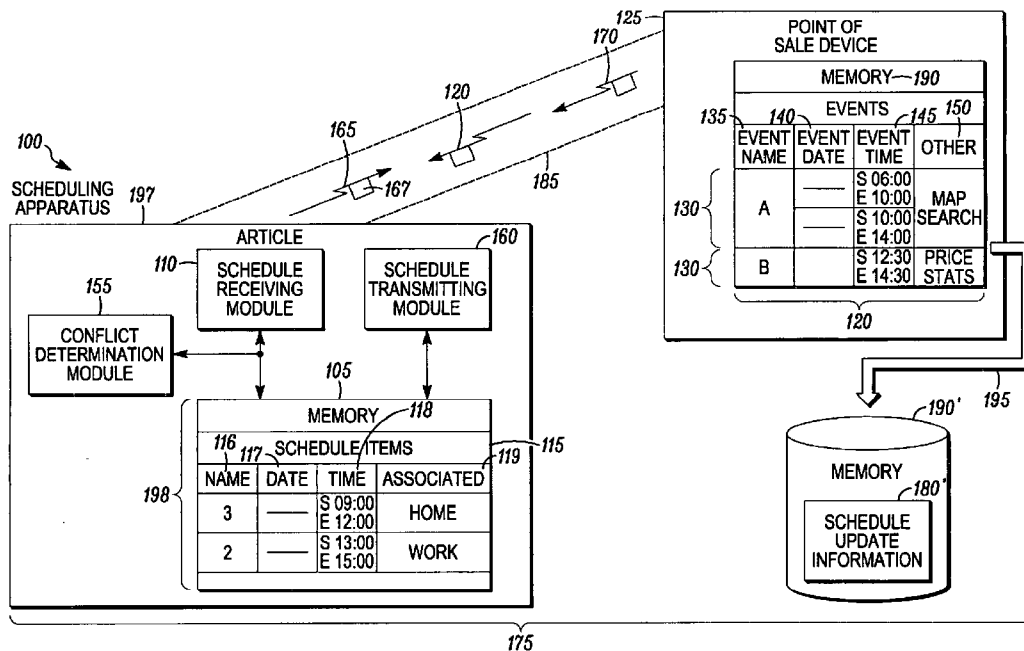
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(57) **ABSTRACT**

A scheduling apparatus, system, and article including a machine-accessible medium, along with a method of dynamically processing events, are disclosed. The apparatus may include a receiving module capable of receiving information associated with an event. The information may include an event name and event time. The apparatus may also include a memory capable of storing the information associated with the event, and being communicatively coupled with the receiving module. The memory may be used to store a plurality of schedule items, at least one of which may be associated with an item time. The method may include selecting an event associated with a transaction and event time, determining whether a conflict exists, and adjusting the set of events stored in the memory to include the information associated with the event if no conflict is found.
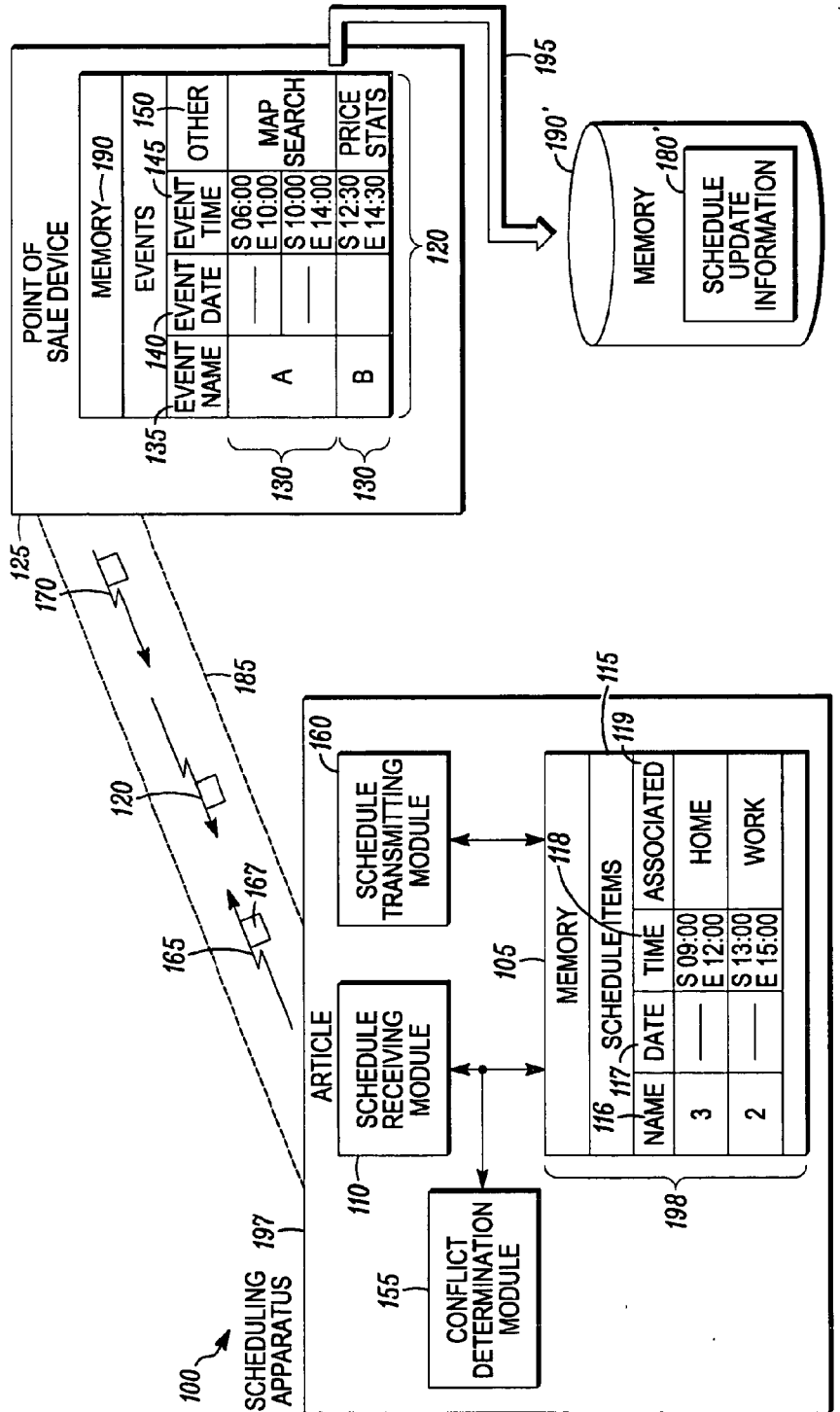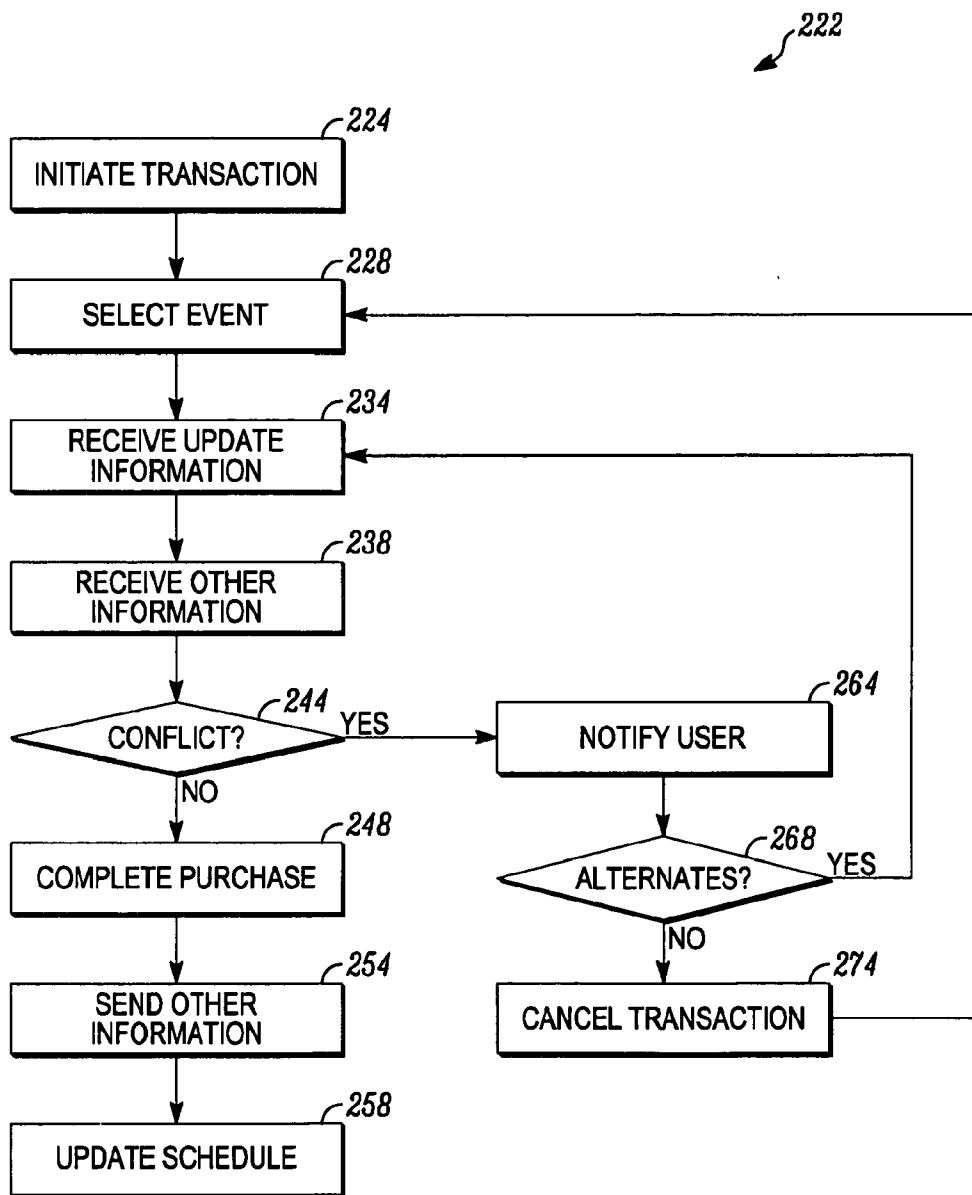
POINT OF
SALE DEVICE

MEMORY—190

EVENTS 145 150

EVENT NAME	EVENT DATE	EVENT TIME	OTHER
A	—	S 06:00 E 10:00	MAP SEARCH
		S 10:00 E 14:00	
B	—	S 12:30 E 14:30	PRICE STATS

135   140

130

130

120

190'

MEMORY 180'

SCHEDULE UPDATE INFORMATION

195

125
170

185

120

167

165

SCHEDULING 197
APPARATUS

100

ARTICLE

SCHEDULE RECEIVING MODULE   110

SCHEDULE TRANSMITTING MODULE   160

CONFLICT DETERMINATION MODULE   155

MEMORY 118

SCHEDULE/ITEMS

115
119
105

NAME	DATE	TIME	ASSOCIATED
3	—	S 09:00 E 12:00	HOME
2	—	S 13:00 E 15:00	WORK

116 117

198

175

FIG. 1

_222_

```
                    ┌──────────────────────┐ ┌224
                    │  INITIATE TRANSACTION │
                    └──────────┬───────────┘
                               │
                    ┌──────────▼───────────┐ ┌228
                    │     SELECT EVENT     │◄──────────────────┐
                    └──────────┬───────────┘                   │
                               │                               │
                    ┌──────────▼───────────┐ ┌234              │
                    │    RECEIVE UPDATE     │◄──────────┐      │
                    │     INFORMATION       │           │      │
                    └──────────┬───────────┘           │      │
                               │                        │      │
                    ┌──────────▼───────────┐ ┌238       │      │
                    │    RECEIVE OTHER      │           │      │
                    │     INFORMATION       │           │      │
                    └──────────┬───────────┘           │      │
                               │     ┌244 YES           │      │
                          ◄────▼────►──────►┌──────────────────┐ ┌264
                          │ CONFLICT? │     │   NOTIFY USER    │
                          ◄────┬────►       └────────┬─────────┘
                               │NO                   │
                    ┌──────────▼───────────┐ ┌248    ▼    ┌268  YES
                    │   COMPLETE PURCHASE  │     ◄────────►──────┘
                    └──────────┬───────────┘     │ ALTERNATES? │
                               │                 ◄────┬────►
                    ┌──────────▼───────────┐ ┌254     │NO
                    │     SEND OTHER        │  ┌──────────▼───────────┐ ┌274
                    │     INFORMATION       │  │  CANCEL TRANSACTION  │──┘
                    └──────────┬───────────┘  └──────────────────────┘
                               │
                    ┌──────────▼───────────┐ ┌258
                    │    UPDATE SCHEDULE    │
                    └──────────────────────┘
```

FIG. 2

METHOD AND APPARATUS FOR DYNAMICALLY PROCESSING EVENTS BASED ON AUTOMATIC DETECTION OF TIME CONFLICTS

RELATED APPLICATIONS

[0001] This application is a Continuation of U.S. patent application Ser. No. 10/000,904 titled "Method and Apparatus for Dynamically Adjusting Electronic Schedules Based on Automatic Detection of Time Conflicts," which was filed on Nov. 15, 2001. This application is entirely incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention relates generally to apparatus and methods used for scheduling. More particularly, the present invention relates to the use of purchased goods to trigger adjustments to electronic schedules.

BACKGROUND INFORMATION

[0003] Individual electronic schedules have become as common as the existence of personal computers. Most desktop computers include some type of personal scheduling software package, as do the increasingly popular palm-top generation of computers. However, the included scheduling packages are typically quite primitive, merely used to record whatever is placed into them by the hand of the user. More advanced scheduling packages offer the ability to cross-schedule between networked users, detecting conflicts and locating personnel based on shared information.

[0004] Given the current state of scheduling software, consumers attempting to schedule their time in conjunction with the purchase of theatre tickets, for example, must consult personal planners, or palm-top computers to verify the existence of available dates and times. Open schedule periods are manually compared with potential event dates. Errors, such as mistaking one month for the next, or one date for another, often occur, due to the exigency of the purchase. Finally, consumers may simply fail to enter information associated with the purchase which may be needed at a later time. Such forgotten items may include seat reservation information, a map of the facility, or a directory of on-site services.

[0005] Therefore, there is a need in the art for an apparatus, an article including a machine-accessible medium, a system, and a method of adjusting a schedule based on the purchase of goods or services associated with such a purchase. The ability to automatically adjust or modify a schedule based on a timed event should be provided to reduce the possibility of human error. Further, revisions of the purchase should be allowed to accommodate schedule conflicts, along with the option of conveying additional related information to the consumer which may be useful at the time of the event (e.g., travel information).

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a block diagram of an apparatus, an article including a machine-accessible medium, and a system according to various embodiments of the present invention; and

[0007] FIG. 2 is flow chart illustrating a method of adjusting a schedule according to an embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] In the following detailed description of the invention, reference is made to the accompanying drawings which form a part hereof, and in which are shown by way of illustration, and not of limitation, specific embodiments in which the invention may be practiced. In the drawings, like numerals describe substantially similar components throughout the several views. The embodiments illustrated are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized and derived therefrom, such that structural and logical substitutions and changes may be made without departing from the scope of the invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the invention is defined only by the appended claims, along with the full range of equivalents to which such claims are entitled.

[0009] FIG. 1 is a block diagram of an apparatus, an article including a machine-accessible medium, and a system according to various embodiments of the present invention. In one embodiment of the invention, the scheduling apparatus 100 may include a memory 105 capable of being communicatively coupled with a schedule receiving module 110. The memory may be used to store a plurality of schedule items 115, each of which may be associated with a name 116, date 117, and an item time 118, which may further include an item start time and an item end time. For example, item "Y" may be associated with the item name "BREAKFAST", a date of Jun. 1, 2001, a start time of 0900, and an end time of 1200. Of course, those skilled in the art will realize that the date(s) 117 and times 118 during which a particular schedule item occurs may be incorporated into a single item "time" 118 (e.g. a "time" of 0001 may be a coded time which means an item is scheduled to occur on Jan. 1, 2001, from 0800 to 1000), into both start and end times (e.g. a "start time" of 0001 may be a coded time which means the scheduled item starts on Jan. 1, 2001 at 0800, and an "end time" may be a coded time which means the scheduled item ends on Jan. 1, 2001 at 1000), or kept separately from timing information, as shown herein. The schedule items 115 stored in the memory 105 may also include other associated elements 119, such as item location/ mapping information, seating availability and parking information, the location and cost of nearby services (e.g., beverage sales, or restaurants), house rules (no flash photography, cell phones turned off), musician's web site address, advertising and marketing (e.g., Purchase a CD of tonight's performance by calling 123-4567.), etc.

[0010] The schedule receiving module 110 is capable of automatically receiving schedule update information 120, perhaps as transmitted by an information repository, such as a vendor's server or point of sale (POS) device 125. Of course, the update information 120 may also as entered by a user of the apparatus 100, perhaps with a keypad, microphone, stylus, or other data entry device. The update information 120 is typically associated with a purchase transaction and at least one event 130, and may include an event name 135 (e.g., event A may be named "CIRCUS"), an event date 140 (e.g., for event A the date may be "Jun. 1, 2001"), and an event time 145, which may include an event start time (e.g., for event A the start time may be "1400") and an event end time (e.g., for event A the end time may be "1600"). Of course, the event time 145 may include coded date and/or start/end timing information, as noted above with respect to schedule items 115. Other informative 150, similar to or identical to

2

any or all of the associated elements **119** described with respect to schedule items **115**, may be associated with the event and included in the update information **120**.

[0011] The scheduling apparatus **100** may also include a conflict determination module **155** capable of being coupled to the memory **115**. The conflict determination module **155** is capable of determining the existence of a schedule conflict between an event time (e.g., the start and end times **145** of an event **135** transmitted to the apparatus **100** in the schedule update information **120**) and scheduled item times (e.g., the date, start and end times of items **115** previously stored in the memory **105**).

[0012] The apparatus **100** may also include a schedule transmission module **160** capable of being coupled to the memory **105**. The transmission module is capable of sending a message **165**, including information regarding the existence of a schedule conflict **167**, to the POS **125**.

[0013] For example, assume that a user of the apparatus **100** attempts to purchase a ticket from a vendor of tickets to a nearby circus. The apparatus **100** may have schedule item **115** information regarding event "Y" stored in the memory **105** for a "BREAKFAST" on Jun. 1, 2001, starting at 0900 and ending at 1200 at a "HOME" location. If the user of the apparatus **100** wishes to attend the event "A", which is a "CIRCUS" occurring on the same day, from 0800 to 1000, a schedule conflict exists. If the event schedule update information **120** is sent to the apparatus **100**, this conflict may be detected by the conflict determination module **155**, and a message **165** including information about the conflict **167** may be sent from the apparatus **100** to the POS device **125**.

[0014] In return, the conflict information message **165** may be received by the POS device **125**, and another message, containing alternative schedule update information **170** associated with the event **130** (e.g., event "A") including an alternative event timing, such as an alternative event start time (e.g., 1400) and an alternative event end time (e.g., 1600). As noted above, the alternative event time information may include coded date and time information, or separate date/time start/end information.

[0015] In another embodiment of the invention, a scheduling system **175** may include a POS device **125** which has schedule update information **180** associated with various events **130** including event names **135**, event dates **140** and/or times **145** (possibly including coded date and/or start/end times). The system **175** may also include a scheduling apparatus **100**, which is capable of being communicatively coupled to the POS device **125**, perhaps by making use of a medium **185**, such as an electronic conductor, an optical conductor, an electromagnetic wave, or a combination of these. Any protocol may be used, including those specified in the Bluetooth™ (e.g., "Bluetooth System Specification," Bluetooth Special Interest Group, Ver. 1.1, March 2001) and Infra-red Data Association (IrDA) standards (e.g., the "Infrared Data Association Minimal IrDA Protocol Implementation," Counterpoint Systems Foundry, Inc., Ver. 1.0, Nov. 6, 1996). As previously described, the apparatus **100** may include a schedule receiving module **110** and a memory **105** (which may be used to store a plurality of schedule items **115**, schedule update information **120**, and/or the alternative schedule update information **170**).

[0016] The POS device **125** may include a memory **190** for storing the event information **180**, or the event information **180'** may be stored in an information repository, such as a memory **190'** separate and apart from the POS device **125**. For

example, the memory **190'** may be co-located with an event sponsor. The memory **190, 190'** may be dedicated to the device **125**, or merely capable of being communicatively coupled with it, such as by using a medium **195** (similar to or identical to the medium **185**).

[0017] The information **180** may be stored in any number of ways, well known to those skilled in the art, such as by storing the information **180** so that each event **130** has other data elements **140, 145**, and **150** associated with the event name **135**. Other information **150**, such as location/mapping information (e.g., a map of the event location), pricing information for the event or local services, and/or seating information, etc. may also be associated with the event name **135** and stored in the memory **190, 190'**.

[0018] It should be noted that the memories **105, 190, 190'**; the schedule receiving module **110**; the conflict determination module **155**; and the schedule transmission module **160** may all be characterized as "modules" herein. Such modules may include hardware circuitry, such as a microprocessor and/or memory circuits, software program modules, and/or firmware, and combinations thereof, as desired by the architect of the apparatus **100** and system **175**, and appropriate for particular implementations of the invention.

[0019] One of ordinary skill in the art will understand that the scheduling apparatus and system of the present invention can be used in applications other than for apparatus such as handheld computers, and systems which include networked servers or POS devices, and thus, the invention is not to be so limited. The illustrations of a scheduling apparatus **100** and a scheduling system **175** are intended to provide a general understanding of the structure of the present invention, and are not intended to serve as a complete description of all the elements and features of scheduling apparatus and systems which might make use of the structures described herein.

[0020] Applications which may include the novel scheduling apparatus and system of the present invention include electronic circuitry used in high-speed computers, communication and signal processing circuitry, modems, processor modules, embedded processors, and application-specific modules, including multilayer, multi-chip modules. Such scheduling apparatus and system may further be included as sub-components within a variety of electronic systems, such as televisions, cellular telephones, personal computers, radios, vehicles, and others.

[0021] FIG. **2** is a flow chart illustrating a method of adjusting a schedule according to an embodiment of the present invention. The method **222** may include initiating a purchase transaction, such as attempting to buy tickets for an event at block **224**. The method **222** may continue with selecting an event associated with the purchase transaction at block **228**. The selected event is typically associated with schedule update information, such as the event name and time, which may further include an event date, an event start time, and an event end time.

[0022] The method **222** may then proceed with receiving the schedule update information at block **234**, and possibly, other associated information at block **238**. For example, if the event is a basketball game, the associated information may include seating and parking information. Thus, if there is a relatively small amount of associated information, it may be downloaded to the user along with the event time data as part of the update information. The associated information may also be downloaded later, after there is more assurance that the purchase transaction will ultimately be completed.

[0023] The method **222** may then continue with determining whether a schedule conflict exists between the event time (e.g., the event start and end times for the selected event) and the item time (e.g., the item start and end times) associated with a schedule item which already exists in the user schedule at block **244**. If no conflict exists, then the purchase transaction may be completed at block **248**, and other information associated with the event may be received at block **254** (e.g. the information discussed with respect to block **238** and/or more lengthy transmissions, such as images of the event or sound clips of performers at the event, etc.). Of course, non-time related information (e.g. a map, pricing, and/or seating information associated with the event name) may also be received at blocks **238** and **254**, according to the desires of those implementing the method **222** of the invention. The method **222** may conclude with adjusting the schedule to include the schedule update information if a schedule conflict is determined not to exist at block **258**.

[0024] If a schedule conflict is detected at block **244**, the scheduled party (or a user of the apparatus, such as apparatus **100** shown in FIG. **1**) may be notified at block **264**, using visual messaging, lighting, and/or audio mechanisms, such as displays, LEDs, speakers, or other transducers. Conflicts may be determined due to a direct event time conflict, as discussed above, or by analyzing other scheduled items, including their location and nature, to determine whether travel time from a scheduled item to a selected event result in a conflict.

[0025] For example, if a doctor's appointment exists as a scheduled item, and it is known that such appointments are regularly delayed an hour or more beyond the scheduled start time, such delays may be taken into consideration, and an "indirect" conflict may be determined at block **244**. Thus, if an event is scheduled less than **90** minutes after the end of the scheduled doctor's appointment a conflict may be generated to account for appointment fulfillment delays, and travel time to the event, given the location of the doctor's office and the event, derived from associated elements and information stored in the memories described above. Thus, more advanced versions of the invention may be able to consider time and distance information between scheduled events, blocking out travel time and alerting consumers to possible conflicts based on the proximity (time and distance) of separate events and schedule items.

[0026] If a conflict exists, a determination can then be made at block **268** as to whether alternative events may be substituted for the selected event. If so, then alternative event time information, include alternative event start and end times, may be received at block **234**. If no alternatives exist, as determined at block **268**, then the transaction may be canceled at block **274**, and the method **222** may include refraining from adjusting the schedule to include the schedule update information. At this time the method **222** may conclude, or may continue with selecting another event associated with a purchase transaction at block **228**.

[0027] Thus, referring back to FIG. **1**, it is now easily understood that another embodiment of the invention may include an article **197**, such as a computer, a memory system, a magnetic or optical disk, some other storage device, and/or any type of electronic device or system, comprising a machine-accessible medium **105** (e.g., a memory including an electrical, optical, or electromagnetic conductor) having associated data **198** (e.g. computer program instructions), which when accessed, results in a machine performing such actions as selecting an event associated with a purchase trans-

action and schedule update information (including an event name, an event start time, and an event end time); receiving the schedule update information; determining whether a schedule conflict exists between the event time and item time (associated with a schedule item); and adjusting the schedule to include the schedule update information if a schedule conflict does not exist.

[0028] The actions may further include refraining from adjusting the schedule to include the schedule update information if a schedule conflict exists, notifying the user of the schedule conflict, and canceling the purchase transaction.

[0029] The apparatus, system, article, and method of the invention provide an efficient mechanism whereby the user of a personal digital assistant (PDA) or other handheld computer, for example, may automatically update schedule information to include useful event information in conjunction with a purchase transaction, such as buying airline tickets. Use of the invention provides an opportunity to reduce the possibility of human error with regard to schedule conflicts, and accommodates alternatives to avoid such conflicts. The invention also provides the option of automatically conveying additional related information to the consumer which may be useful at the time of the event (e.g., travel information). Some versions of the invention may also consider time and distance information between scheduled events, blocking out travel time and alerting consumers to conflicts based on the proximity (time and distance) of separate events.

[0030] Although specific embodiments have been illustrated and described herein, those of ordinary skill in the art will appreciate that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This disclosure is intended to cover any and all adaptations or variations of the present invention. It is to be understood that the above description has been made in an illustrative fashion, and not a restrictive one. Combinations of the above embodiments, and other embodiments not specifically described herein will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention includes any other applications in which the above structures and methods are used. The scope of the invention should be determined with reference to the appended claims, along with the full range of equivalents to which such claims are entitled.

1-20. (canceled)

21. A handheld electronic device capable of wireless communication with a point of sale system, the handheld electronic device comprising:

memory;

at least one module capable of generating, based at least in part upon user input, schedule related information for storage in the memory, the user input being received, at least in part, via a microphone of the handheld electronic device;

the schedule related information being capable of including, for an associated schedule item, name, start time, end time, date, and associated information;

the associated information being capable of including:

location information associated with the associated schedule item; and

travel time information determined based at least in part upon the location information;

the at least one module being capable of providing at least one alert based at least in part upon the travel time information; and

the handheld electronic device being capable of transmitting a point of sale-related communication via the wireless communication.

22. The handheld electronic device of claim 21, wherein:
the at least one module is also capable of determining, at least in part, whether conflict exists between schedule items.

23. The handheld electronic device of claim 21, wherein:
the associated information also includes, at least in part, at least one of:
map data;
seating information; and
pricing information.

24. The handheld electronic device of claim 21, wherein:
the handheld electronic device comprises a cellular telephone.

25. The handheld electronic device of claim 21, wherein:
the handheld electronic device comprises a handheld computer.

26. The handheld electronic device of claim 21, wherein:
the at least one module comprises a plurality of software modules.

27. The handheld electronic device of claim 21, wherein:
the at least one module comprises at least one of:
at least one software module; and
at least one firmware module.

28. The handheld electronic device of claim 21, wherein:
the handheld electronic device is capable of communicating in accordance with a Bluetooth Specification.

29. The handheld electronic device of claim 21, wherein:
the associated information is provided, at least in part, by at least one remote server.

30. The handheld electronic device of claim 21, wherein:
the purchase transaction is related to an event ticket.

31. The handheld electronic device of claim 21, wherein:
the location information indicates an event location.

32. Machine-accessible memory storing program instructions that when executed by a machine result in performance of operations, comprising:
generating by at least one module, based at least in part upon user input, schedule related information for storage in memory of a handheld electronic device, the user input being received, at least in part, via a microphone of the handheld electronic device, the handheld electronic device being capable of wireless communication with a point of sale system;

the schedule related information being capable of including, for an associated schedule item, name, start time, end time, date, and associated information;
the associated information being capable of including:
location information associated with the associated schedule item; and
travel time information determined based at least in part upon the location information;
the at least one module being capable of providing at least one alert based at least in part upon the travel time information; and
the handheld electronic device being capable of transmitting a point of sale-related communication via the wireless communication.

33. The machine-accessible memory of claim 32, wherein:
the at least one module is also capable of determining, at least in part, whether conflict exists between schedule items.

34. The machine-accessible memory of claim 32, wherein:
the associated information also includes, at least in part, at least one of:
map data;
seating information; and
pricing information.

35. The machine-accessible memory of claim 32, wherein:
the handheld electronic device comprises a cellular telephone.

36. The machine-accessible memory of claim 32, wherein:
the handheld electronic device comprises a handheld computer.

37. The machine-accessible memory of claim 32, wherein:
the at least one module comprises a plurality of software modules.

38. The machine-accessible memory of claim 32, wherein:
the at least one module comprises at least one of:
at least one software module; and
at least one firmware module.

39. The machine-accessible memory of claim 32, wherein:
the handheld electronic device is capable of communicating in accordance with a Bluetooth Specification.

40. The machine-accessible memory of claim 32, wherein:
the associated information is provided, at least in part, by at least one remote server.

41. The machine-accessible memory of claim 32, wherein:
the purchase transaction is related to an event ticket.

42. The machine-accessible memory of claim 32, wherein:
the location information indicates an event location.

* * * * *