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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EDWIN W. PETERS, SHERRY L. PLATEK, NITTY T. PULIKAN, BALAJI RANGANATHAN, LIVIU RODEAN, BALASUBRAMANIAN SIVASUBRAMANIAN, and ERIC WOODS

Appeal 2019-000215
Application 13/839,038
Technology Center 2600

Before JOHN A. JEFFERY, ERIC S. FRAHM, and MELISSA A. HAAPALA, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

This application returns to us after we affirmed the Examiner's decision to reject then-pending claims 8, 10–15, and 17–20. *Ex parte Peters*, Appeal No. 2016-004920 (PTAB Apr. 28, 2017) ("Bd. Dec."), *reh'g denied* (PTAB Aug. 2, 2017) ("Reh'g Dec."). Prosecution reopened after that decision, and Appellant[1] now appeals under 35 U.S.C. § 134(a) from the Examiner's subsequent rejection of claims 21–40. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as IBM Corporation. Appeal Br. 1.

STATEMENT OF THE CASE

Appellant's invention automatically takes notes in a virtual meeting including plural meeting content streams, at least one of which is in a non-text format. After converting the latter streams to text, the text is analyzed to identify a key element within the text to generate consolidated notes including that element. *See generally* Abstract. Claim 21 is illustrative:

> 21. A computer hardware system, comprising:
> a hardware processor configured to initiate the following executable operations:
> receiving a first meeting content stream from a first participant of a virtual meeting;
> receiving a second meeting content stream from a second participant of the virtual meeting;
> analyzing text of the first and second meeting content streams to identify key elements therein;
> cross-referencing the analysis of the text of first and second meeting content streams to identify a common key element in the analysis thereof that is common to both the first and second meeting content streams; and
> generating consolidated system notes that include the common key element, wherein the identifying of a key element includes establishing that each key element meets a predetermined threshold of significant [sic].

RELATED APPEALS

As noted previously, we affirmed the Examiner's decision to reject then-pending claims 8, 10–15, and 17–20 in an earlier appeal in the present application. The prior art at issue in this appeal, however, differs from that cited in the earlier appeal.

This appeal is also related to appeals filed in (1) Application No. 14/216,682 (Appeal No. 2019-000163); (2) Application No. 13/838,731

(Appeal No. 2019-002741); and (3) Application No. 14/523,250 (Appeal No. 2019-002736). *See* Appeal Br. 1–2, 29.[2]

THE REJECTIONS

The Examiner provisionally rejected claims 21–40 on the ground of nonstatutory double patenting over claims 21–30 of copending Application No. 14/216,682. Final Act. 4–6.

The Examiner rejected claims 21–25, 29–35, 39, and 40 under 35 U.S.C. § 102(b) as anticipated by Bobbitt (US 2009/0276492 A1; published Nov. 5, 2009). Final Act. 6–10.

The Examiner rejected claims 26–28 and 36–38 under 35 U.S.C. § 103 as unpatentable over Bobbitt and Caspi (US 2004/0114746 A1; published June 17, 2004). Final Act. 11–12.

THE PROVISIONAL DOUBLE PATENTING REJECTION

Because Appellant does not contest the Examiner's provisional double patenting rejection of claims 21–40 (*see* Appeal Br. 3 n.1), we summarily sustain this rejection. *See* Manual of Patent Examining Procedure (MPEP) § 1205.02 (9th ed. Rev. 08.2017, Jan. 2018); *see also* Reh'g Dec. 2–3 (explaining why we properly summarily sustained the Examiner's provisional double patenting rejection in the earlier appeal).

[2] Throughout this opinion, we refer to (1) the Final Rejection mailed February 27, 2018 ("Final Act."); (2) the Appeal Brief filed July 19, 2018 ("Appeal Br."); (3) the Examiner's Answer mailed August 28, 2018 ("Ans."); and (4) the Reply Brief filed October 8, 2018 ("Reply Br.").

THE ANTICIPATION REJECTION

The Examiner finds that Bobbitt discloses every recited element of independent claim 21 including a hardware processor configured to initiate the recited executable operations including (1) receiving first and second meeting content stream from first and second virtual meeting participants, respectively; and (2) cross-referencing the analysis of these streams' text to identify a common key element in the analysis that is common to both streams. Final Act. 6–7.

Appellant argues that Bobbitt does not receive two different content streams from the same virtual meeting, let alone cross-reference textual analysis of those streams to identify a common key element as claimed. Appeal Br. 9–15; Reply Br. 2–5. According to Appellant, Bobbitt's "commonalities" are determined based on common participants—not cross-referencing textual analysis as claimed. Appeal Br. 12; Reply Br. 4–5.

ISSUE

Under § 102, has the Examiner erred in rejecting claim 21 by finding that Bobbitt discloses a hardware processor configured to initiate (1) receiving first and second meeting content stream from first and second virtual meeting participants, respectively; and (2) cross-referencing the analysis of these streams' text to identify a common key element in the analysis that is common to both streams (the "cross-referencing limitation")?

ANALYSIS

As noted above, a key disputed issue is whether Bobbitt discloses a hardware processor configured to initiate receiving meeting content *streams* from respective participants of the same virtual meeting. The Specification, however, does not define the term "stream," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See, e.g.*, Spec. ¶¶ 12, 21, 34–35, 47, 62, 64–67 (defining various terms explicitly). The Specification does, however, explain that meeting content can include, for example, (1) messaging (e.g., chat, instant messaging), (2) video, and/or (3) audio data, and that this content can be transmitted across one or more *channels or streams* and recorded. Spec. ¶ 28. The Specification's paragraphs 39 to 43 give examples of these meeting content streams, including meeting slides as an example of a video stream, and chat as an example of a messaging stream. Notably, however, meeting content streams are not limited to messaging, video, and audio data: they can also include some *other unspecified* form of meeting content stream. *See* Spec. ¶ 36 (listing exemplary meeting content as a (1) video stream; (2) audio stream; (3) messaging stream; and/or (4) *other* meeting content stream).

This description informs our understanding of the recited meeting content streams, and that it is not limited to a particular type of stream. We, therefore, construe the term "stream" with its plain meaning in the art that is synonymous with "channel," namely "a path for data." *See* Ian R. Sinclair, THE HARPERCOLLINS DICTIONARY OF COMPUTER TERMS 39 (1991) (noting that a "channel" is also called a "stream"), 229 (defining "stream" by referring to the definition of "channel"). *Accord* Spec. ¶ 28 (noting that meeting content can be transmitted across one or more *channels or streams* and recorded).

Given this construction, we see no error in the Examiner's finding that Bobbitt discloses receiving meeting content streams from respective participants of the same virtual meeting. As noted in the Abstract, Bobbitt's system automatically summarizes significant events that occur within a collaborative discussion in an immersive collaborative environment. To this end, the system summarizes a captured record, namely a sequential data set that can include, among other things, *audio, video, and user comments* so that by documenting the associated collaborative discussion within a virtual workspace environment, a user can obtain the gist or substance of a meeting that occurred within that environment. *See* Bobbitt ¶¶ 32–35. Specifically, activities or events within a virtual workspace or immersive collaborative environment are monitored in real- or near real-time, including, among other things, content, actions, data accesses, *individuals* present, and conversations, and significant events are inferred from this monitoring. Bobbitt ¶¶ 45–46.

Because users participate in this virtual workspace or immersive collaborative environment via their workstations as shown in Bobbitt's Figure 1, data that is monitored within this environment, including the associated audio, video, and discussion, would have been received via meeting content streams, namely data paths, from respective participants. Although only one participant is shown using a workstation in Bobbitt's Figure 1, there are nevertheless other participants in that virtual workspace as shown by their avatars in the virtual conference room depicted in that workspace. *See* Bobbitt ¶ 38 (noting that users are represented in the virtual business or enterprise environment as avatars that occupy the spaces or rooms), ¶ 39 (noting that *groups of users* can be depicted as performing

business tasks while in the virtual world, including attending meetings or collaborating with others).

Although the users' *avatars* are shown seated (or standing) around a table in the virtual workspace in Bobbitt's Figure 1, the *actual* users are nevertheless participating in that virtual meeting via their respective workstations, transferring data to and from the system hosting that virtual workspace via their respective data paths or streams. *Accord* Ans. 9 (noting that each user in Bobbitt's Figure 1 has a workstation, and content is necessarily received from each user's workstation to establish and conduct a meeting). That the block diagrams of Bobbitt's immersive collaborative system and associated computing environment in Figures 4 and 10 show *devices for multiple clients* as the Examiner indicates (Ans. 9) only bolsters the Examiner's findings in this regard. *See* Bobbitt ¶¶ 56–57, 99–101 (describing the functionality of Figures 4 and 10).

Nor are we persuaded of error in the Examiner's finding that Bobbitt's criteria identification component functionality in Figure 8 anticipates the recited cross-referencing limitation. *See* Final Act. 7 (citing Bobbitt ¶¶ 79–81); Ans. 9–11. As we noted in our earlier decision, the term "cross-referencing" is not defined in the Specification, unlike other terms whose concrete definitions leave no doubt as to their meaning. *See* Bd. Dec. 5–6. We further noted that, according to the Specification's paragraph 37, analysis engine 125 can index and/or *cross-reference* meeting content to extract key elements therefrom, and that this extraction can use significance scoring based on (1) time spent on the point; (2) the point's appearance in multiple meeting content streams; (3) note commonalities, etc. *Id.* We emphasized, however, that although this broad and exemplary description

informed our understanding of cross-referencing in the context of the claimed invention in the earlier appeal, it was not so limited. *Id.* 6.

That is the case here. Therefore, as in our earlier decision, we construe the term "cross-reference" under its plain meaning, namely "reference from one part of a book, etc., to another." *Id.* 6 (citing dictionary definition). With this construction, we see no error in the Examiner's finding that Bobbitt anticipates the recited cross-referencing limitation.

Bobbitt's paragraphs 79 to 81, on which the Examiner relies (*see* Final Act. 7; Ans. 9–11), refer to an alternative system in Figure 8 that uses a criteria identification component 108 that includes (1) content determination component 802; (2) contacts determination component 804; and (3) context determination component 806. As explained in Bobbitt's paragraph 79, the content determination component can establish the subject of discussion within a virtual environment by using, among other things, speech recognition, text analyzers, or pattern recognition to gather information about the virtual workspace—information that is then analyzed to establish the workspace's content.

Similarly, the contacts determination component can employ voice or pattern recognition to identify presence of contacts within the environment, where this presence information can be used to further analyze the factors surrounding the discussion within the virtual environment. Bobbitt ¶ 80. For example, commonalities can be drawn between contacts to increase probabilities of determining a topic of discussion from the record. *Id.* If, for example, there are three participants in an immersive collaborative discussion, it can be determined that these three individuals are members of the team for Project XYZ, and, therefore, it can be determined that there is a

high probability that the discussion is centered around Project XYZ. *Id.* Notably, this determination can be supplemented with other information, such as content determined by the content determination component. *Id.*

The clear import of this functionality is that, by using text analysis and *pattern recognition* to gather and analyze information to (1) establish the virtual workspace's content and contacts; (2) draw commonalities between these contacts; and (3) determine the topic of discussion involving these contacts, Bobbitt's system effectively cross-references the textual analysis of the participants' meeting content streams or data paths to identify a common key element, namely the topic. We emphasize Bobbitt's pattern recognition here, for this technique includes *textual* pattern recognition. *See* MICROSOFT COMPUTER DICTIONARY 394 (5th ed. 2002) (defining "pattern recognition," in pertinent part, as "[t]he recognition of purely mathematical or *textual* patterns") (emphasis added). Appellant's contention, then, that Bobbitt is ostensibly silent as to how Bobbitt determines that the three participants are members of the same team for Project XYZ in paragraph 80 (Reply Br. 4) is unpersuasive. This contention ignores the fact that textual pattern recognition is used to identify participants from which commonalities are drawn—participants who transfer data to and from the system hosting the virtual workspace via their respective data paths or streams as noted previously. That Bobbitt's topic determination based on this pattern recognition can be *supplemented with other information* similarly obtained via textual analysis and pattern recognition, such as content determined by the content determination component (as noted in paragraph 80), only further bolsters the notion that Bobbitt effectively cross-references the textual analysis of the participants' meeting content streams or data paths to

identify a common key element, namely the topic of the participants' discussion.

Lastly, we note that although the Examiner relies on the embodiments of Bobbitt's Figures 1 and 8 in finding that Bobbitt anticipates claim 21 (*see* Final Act. 6–7; Ans. 9–11), this multi-embodiment approach is not only undisputed on this record, it is not dispositive of error in the Examiner's anticipation rejection in any event. It is well settled that a prior art reference can anticipate a claim even if the reference does not expressly spell out all limitations arranged or combined as claimed if ordinarily skilled artisans, reading the reference, would "at once envisage" the claimed arrangement or combination. *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1343 (Fed. Cir. 2016) (quoting *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1383 (Fed. Cir. 2015)). That is, a reference need not always expressly discuss the actual combination to anticipate. *Blue Calypso*, 815 F.3d at 1344. Rather, a reference can still anticipate if it teaches that the disclosed components or functionalities may be combined, and ordinarily skilled artisans would be able to implement the combination. *Id.*

That is the case here, at least with respect to common virtual workspace and participant functionalities shown in Bobbitt's Figures 1 and 8. We reach this conclusion noting the figures' striking similarity in this regard, including their identical depictions of the virtual workspace and its participants, the immersive collaborative display, and participant using a workstation.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 21, and claims 22–25, 29–35, 39, and 40 not argued separately with particularity.

THE OBVIOUSNESS REJECTION

Claims 26 and 36

We are also unpersuaded of error in the Examiner's obviousness rejection of claim 26, which recites:

> the common key element, within the consolidated system notes, includes a link to at least a portion of the first and second meeting content streams that are stored within a database, and the portion, to the link is directed, includes a relevant portion of the first and second meeting content streams from which the common key element was extracted.

Although the Examiner acknowledges on page 11 of the Final Rejection that Bobbitt does not teach these elements specifically, and cites Caspi to cure this deficiency, the Examiner nonetheless clarifies on pages 12 and 13 of the Answer that Bobbitt—not Caspi—was cited to teach the recited (1) common key element; (2) consolidated system notes; and (3) first and second meeting streams. As part of this clarification, the Examiner emphasizes that Caspi was cited merely for teaching linking original content streams at relevant points in a summary, and that the claim would have been obvious over Bobbitt's and Caspi's collective teachings. *See* Ans. 12–13; Final Act. 11 (explaining that it would have been obvious to combine Caspi's linking functionality with Bobbitt's system to allow the user to more easily review relevant portions of a conference).

Despite Appellant's arguments to the contrary (Appeal Br. 15–19; Reply Br. 5–8), we see no harmful error in the Examiner's obviousness rejection as clarified in the Answer. First, a key aspect of this dispute centers on the meaning of the term "link" in the context of claim 26, namely that the common key element, within the consolidated system notes,

includes a *link* to a portion of the stored meeting content streams. The Specification, however, does not define the term "link," unlike other terms whose concrete definitions leave no doubt as to their meaning. *See*, *e.g.*, Spec. ¶¶ 12, 21, 34–35, 47, 62, 64–67 (defining various terms explicitly). Although the Specification's paragraph 21 defines the term "communicatively linked" clearly and unambiguously, there is no such concrete definition for the term "link" as the term is used in claim 26—an omission underscored by Appellant's reliance on a general-purpose dictionary in defining the term. *See* Reply Br. 7.

Nevertheless, the Specification discusses various linking functionalities in paragraphs 31, 44, 46, and 54. Paragraph 31, for example, explains that virtual meeting module 120 can be configured to *link* meeting content 140 to the data extracted therefrom (e.g., the text of the audio, video and/or messaging channels). Notably, this paragraph indicates, quite broadly, that this linking can be performed *in any suitable manner* including, for example, tagging the meeting content with a timestamp to indicate when each meeting content portion was made. Spec. ¶ 31. The Specification adds, quite broadly, that data or notes extracted or generated from the meeting content can be *linked or otherwise associated with* virtual meeting content having the same timestamp to allow quick recall of meeting content during that timestamp. *Id.*

The Specification's paragraph 44 similarly discusses linking in broad and exemplary terms. That paragraph explains that consolidated system notes 145 can include *links* back to the associated the meeting content. For example, the consolidated system notes can present key elements that provide links back to the underlying recording of one or more content

streams of the meeting content from which the notes were extracted. Spec. ¶ 44. The Specification adds that this linking of the consolidated system notes to the original meeting content can include linking the notes to surrounding meeting content to provide context. *Id.*

The Specification's paragraph 46 similarly discusses linking in broad and exemplary terms. That paragraph explains that each key element may link to individual content streams relating to that element, and that the virtual meeting module can link the key elements to meeting content recordings that occurred at or near the same time. For example, the virtual meeting module can tag the meeting content with a timestamp indicating when each portion of the meeting content was made. Spec. ¶ 46. The Specification further explains, quite broadly, that the virtual meeting module can *link* the notes or key elements extracted from the meeting content with the actual meeting content, allowing quick recall of audio, video, chat and/or other data streams during that time. *Id.*

Although these descriptions inform our understanding of the recited link in the context of the disclosed invention, the term is not so limited. We, therefore, construe the term "link" with its plain meaning in the art. The term "link" is defined, in pertinent part, as synonymous with a pointer, namely "[a] character or group of characters that indicates the location of an item of data in memory." John Daintith & Edmund Wright, THE FACTS ON FILE DICTIONARY OF COMPUTER SCIENCE 122 (Revised ed. 2006) (small capital letters omitted) ("Facts on File Dictionary"). *Accord id.* at 173 (defining the term "pointer" similarly).

Given this interpretation, we see no error in the Examiner's reliance on Caspi's summarization functionality for at least suggesting the recited

link (Ans. 12–13), particularly in view of Caspi's indices in Figure 9B that mark "points" or recording cues by a time stamp on a recorded conference 900b. *See* Caspi ¶¶ 70–71. These index-based pointers reasonably comport with the definition of "link" above, namely "[a] character or group of characters that indicates the location of an item of data in memory." Facts on File Dictionary 173.

We reach this conclusion even if claim 26 required an activatable link—which it does not. Although dependent claim 27 requires activating the link, there is no such activation in claim 26 from which claim 27 depends, nor will we import such a requirement into claim 26 despite Appellant's arguments to the contrary. *See* Appeal Br. 19 (arguing that claim 26's link is "activatable code"). Nevertheless, Appellant's arguments regarding Caspi's individual shortcomings regarding the recited link (App. Br. 15–19; Reply Br. 5–8), do not show nonobviousness where, as here, the rejection is not based on Caspi alone, but rather based on the cited references' collective teachings. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). *Accord* Ans. 12–13 (noting this point).

Although the claimed invention is not "a recipe to make soup" as Appellant contends (Reply Br. 6), familiar items may nevertheless have obvious uses beyond their primary purposes, and often ordinarily skilled artisans can fit multiple references' teachings together like puzzle pieces, as is the case here. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 420 (2007). On this record, then, the Examiner's proposed enhancement uses prior art elements predictably according to their established functions—an obvious improvement. *See id.* at 417. Moreover, the Examiner provides persuasive rationale to support the combination, namely that the

combination would allow the user to more easily review relevant portions of the conference. *See* Final Act. 11.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 26, and claim 36 not argued separately with particularity.

Claims 27, 28, 37, and 38

We also sustain the Examiner's rejection of claim 27, which recites "activation of the link, within the consolidated system notes, causes the relevant portion of the first and second meeting content streams from which the common key element was extracted to be presented." Despite Appellant's arguments to the contrary (Appeal Br. 20; Reply Br. 8–10), we see no error in the Examiner's reliance on Caspi's summarization functionality for at least suggesting the recited link activation and resulting content presentation (Final Act. 12; Ans. 14), particularly in view of Caspi's indices in Figure 9B that mark "points" or recording cues by a time stamp on a recorded conference 900b for playback. *See* Caspi ¶¶ 55, 70–71.

After a participant, such as a moderator, activates or invokes a "recording cue," such as the cues at times Ta and Tb in Caspi's Figure 4, Caspi's system either marks predetermined periods (e.g., 410 and 412) on the recorded conference or saves these periods as a separate summary file. *See* Caspi ¶¶ 55. That is, for later playback, the system either marks the point where the cue was recorded on the conference's master recording, or stores the associated passage in a separate file. Caspi ¶ 62. In either case, the conference portion pertinent to the cue is designated for later playback. *Id.*

As shown in Caspi's Figures 7A and 7B, summarizations are played by *activating* a summary function via the user interface in Figure 7B by (1) selecting the conference from window 7002, and (2) selecting the play button. Caspi ¶¶ 64–66. Our emphasis underscores that by activating this summary playback functionality, the associated links to the respective content portions, such as those shown in Caspi's Figure 9B, are effectively activated to retrieve and play back the particular content portions associated with those links. *Accord* Ans. 11. We reach this conclusion emphasizing that claim 27 does not specify *how* the link is activated—an activation that is at least suggested by Caspi's link-based playback functionality.

Appellant's arguments, including Caspi's summaries and complete record in paragraph 71 being within the same file (Appeal Br. 20; Reply Br. 8–10) are not only in commensurate with the scope of the claim, but also do not show nonobviousness where, as here, the rejection is not based on Caspi alone, but rather based on the cited references' collective teachings. *See Merck*, 800 F.2d at 1097.

Therefore, we are not persuaded that the Examiner erred in rejecting claim 27, and claims 28, 37, and 38 not argued separately with particularity.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
21–40 (provisional)	obviousness-type double patenting	21–40	
21–25, 29—35, 39, 40	§ 102 Bobbitt	21–25, 29–35, 39, 40	
26–28, 36–38	§ 103 Bobbitt, Caspi	26–28, 36–38	
Overall Outcome		21–40	

AFFIRMED

Notice of References Cited	Application/Control No. 13/839,038	Applicant(s)/Patent Under Patent Appeal No. 2019-000215	
	Examiner	Art Unit 2658	Page 1 of 1

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NON-PATENT DOCUMENTS

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	U	John Daintith & Edmund Wright, THE FACTS ON FILE DICTIONARY OF COMPUTER SCIENCE 122 (Revised ed. 2006).
	V	Ian R. Sinclair, THE HARPERCOLLINS DICTIONARY OF COMPUTER TERMS (1991), 229.
	W	MICROSOFT COMPUTER DICTIONARY 394 (5th ed. 2002)
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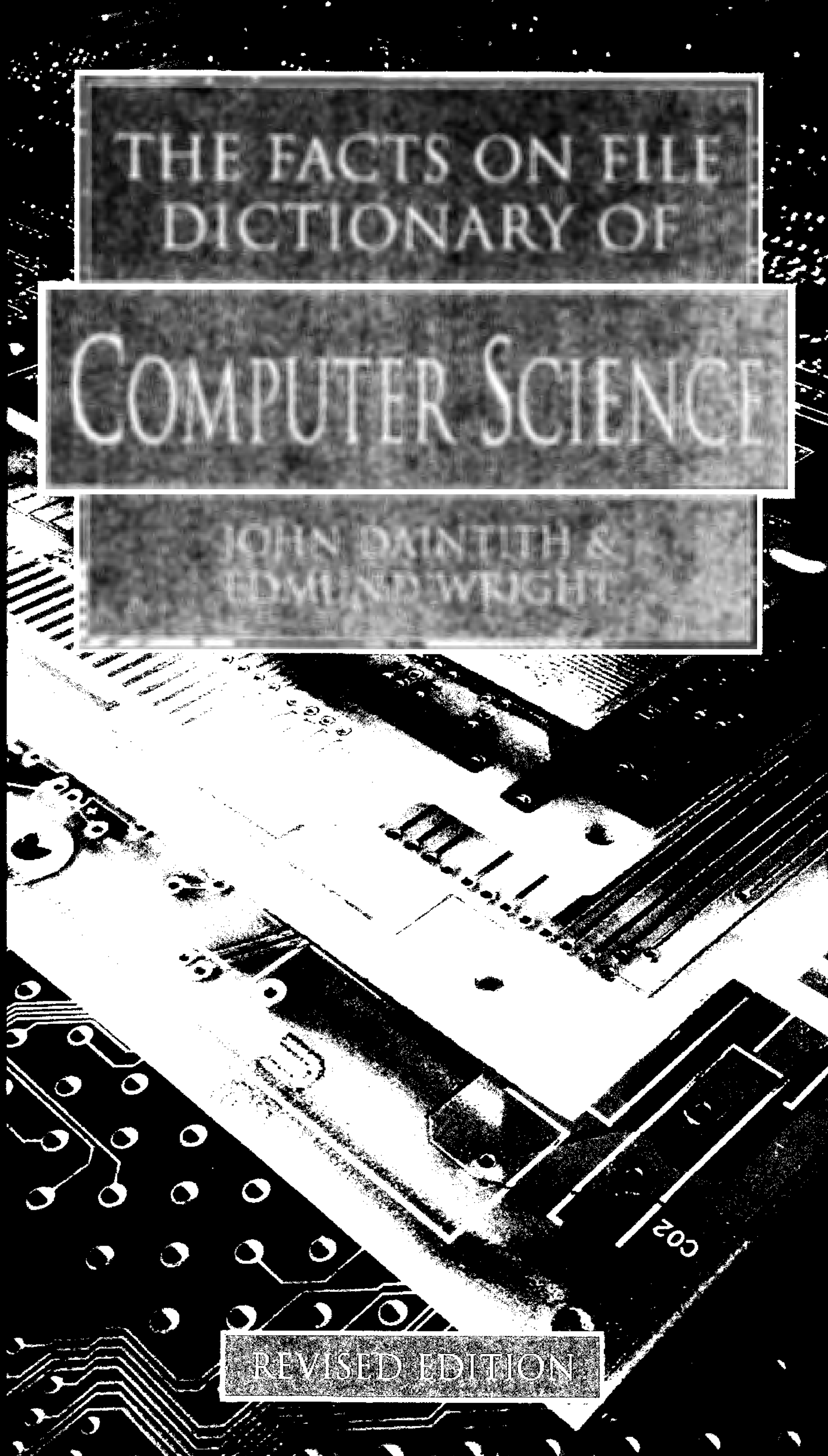

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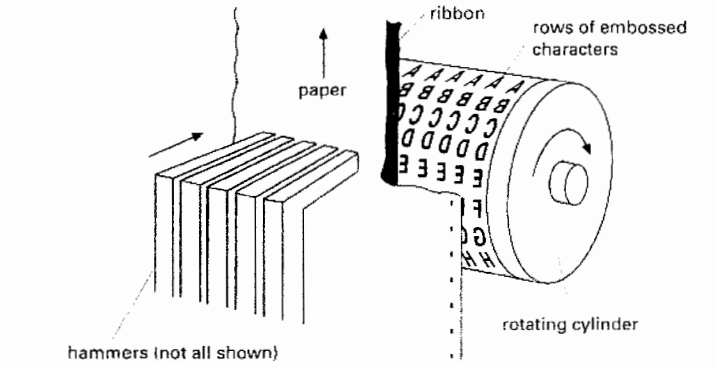

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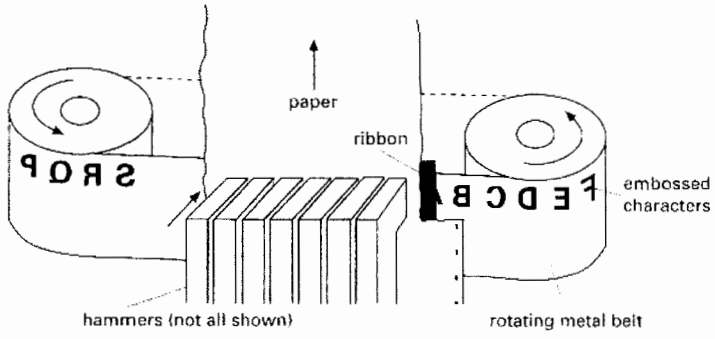

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link 1. (linkage) The part of a computer program, possibly a single instruction or address, that passes control and PARAMETERS between separate portions of the program.
2. (pointer) A character or group of characters that indicates the LOCATION of an item of data in memory.
3. A path for communications. *See* data link.
4. *See* hypertext.
5. To join together program modules that have been compiled separately to form a program that can be executed. This operation is performed by a LINK EDITOR.

linkage *See* link.

link editor (linkage editor; linker) A UTILITY PROGRAM that combines a number of user-written or library routines, which have already been compiled or assembled but are individually incomplete, into a single executable program. This program is then either stored on disk or placed in main store for immediate execution. A link editor that performs the latter function is sometimes called a *link loader*. *See also* program library.

linked list *See* list.

:nker *See* link editor.

..nk loader *See* link editor.

.nkrot /link-rot/ *Informal* The ... on in which HYPERTEXT leads ... because Web sites have removed ... ed their Web pages and the ... dated.

Linux /lin-ûks/ A freely distribut... rating system that runs on seve... are platforms including Int... Motorola microprocessors, and ... s and Macintoshes. Linux is ... IX written by Linus Torvalds. Its ... creased rapidly in recent years, esp... SERVERS.

Liquid crystal display *See* LCD.

Lisp A high-level programming ... those name is derived from **list p**... It was developed in the early 19... as designed specifically for the ma... on of LIST and TREE structures of ... mands and has an unusual SYNT... later taken up by those working ... emergent field of ARTIFICIAL INTE... There are now a number of dialects ... extended in various directions. Lisp p... grams are generally translated by an ... PILER.

list One form in which a collec... data items can be held in compute... ry. The items themselves are in a par... ar order. The items could all be ... for example, or real numbers, or lette... they could be a mixture of, say, ... and real numbers. If all the items are ... same type then the list is a one-dimens... ARRAY.

There are two commonly used ... which this collection of data items ... in memory. In a *sequentially allocat*... the items are stored in their correct ... adjacent LOCATIONS. In a *linked list* ... cation contains a data item and a ... taining the address of the next item ... list; the last item has a special link ... ing that there are no more items in ... Various operations can be perform...

music tracks but has been extended to other types of audio content. An item made available in this way is called a *podcast*, the act of doing so is to *podcast*, and a person or organization that does so is a *podcaster*. Many radio broadcasters are making their programs available as podcasts and are expecting podcasting to become an important distribution method. However, podcasting is not confined to established media companies: anybody with appropriate hardware and software – both of which are cheap and widely available – can create an MP3 file, post it on the Web, and advertise its content through a WEB FEED. The term 'podcasting' was first used in 2005 and is a blend of 'iPod' and 'broadcasting' – a tribute to the IPOD's iconic status as the archetypal MP3 player, although neither an iPod nor any other MP3 player is essential to listen to podcasts. It is expected that podcasts will soon encompass video as well as audio content.

point 1. In typography, a unit equal to just under 1/72 of an inch that is used to measure the height of a character and the distance between lines of text (leading). In computer DTP software, fonts, and page description languages, a point is usually regarded as equalling exactly 1/72 of an inch. 2. A single pixel on a screen, which is identified by its row and column numbers.

point-and-click To select data or an object on a screen by using a mouse (or similar device) to move the cursor to the object (point) and then pressing a button (click) on the mouse to select the object. The term applies to any pointing device.

pointer (link) A character or group of characters that indicates the LOCATION of an item of data in memory.

pointing device Any device that identifies a point on a VDU and transmits its location to a computer. Examples are CURSOR KEYS, a MOUSE, JOYSTICK, TRACKERBALL, TOUCH-SENSITIVE DEVICE, or DIGITIZING PAD.

point of presence (POP) A point in a WAN to which a user can connect with, for example, a local telephone call. For example, an ISP has a point of presence on the Internet.

point of sale (POS) The place where goods are paid for in a store, etc., often with a POINT-OF-SALE TERMINAL linked to a computerized transaction system.

point-of-sale terminal (POS terminal) A specialized cash register, credit-card recording system, or ticket dispenser that records the details relating to the sale of goods, generally using a scanner to read bar codes or tags, and feeds the information into a central computer. This system improves stock, cash, and credit control.

point-to-point protocol (PPP) A protocol used by machines that support serial interfaces, such as modems and ADSL transceivers. PPP is commonly used to provide and access dial-up services to Internet service providers. PPP can share a line with other users, and unlike SLIP it can handle asynchronous as well as synchronous communication and has error detection included.

policy In policy-based networking, a set of definitions showing how the network's resources are to be allocated among its users. Parameters for allocation, which can be static or dynamic, include items such as time of day, client priority, and resource availability. Policies are created by network managers and used by network-management software to make decisions. Policies can also be used to control how much freedom networked users are permitted in other areas, for example to what extent they may customize their DESKTOP.

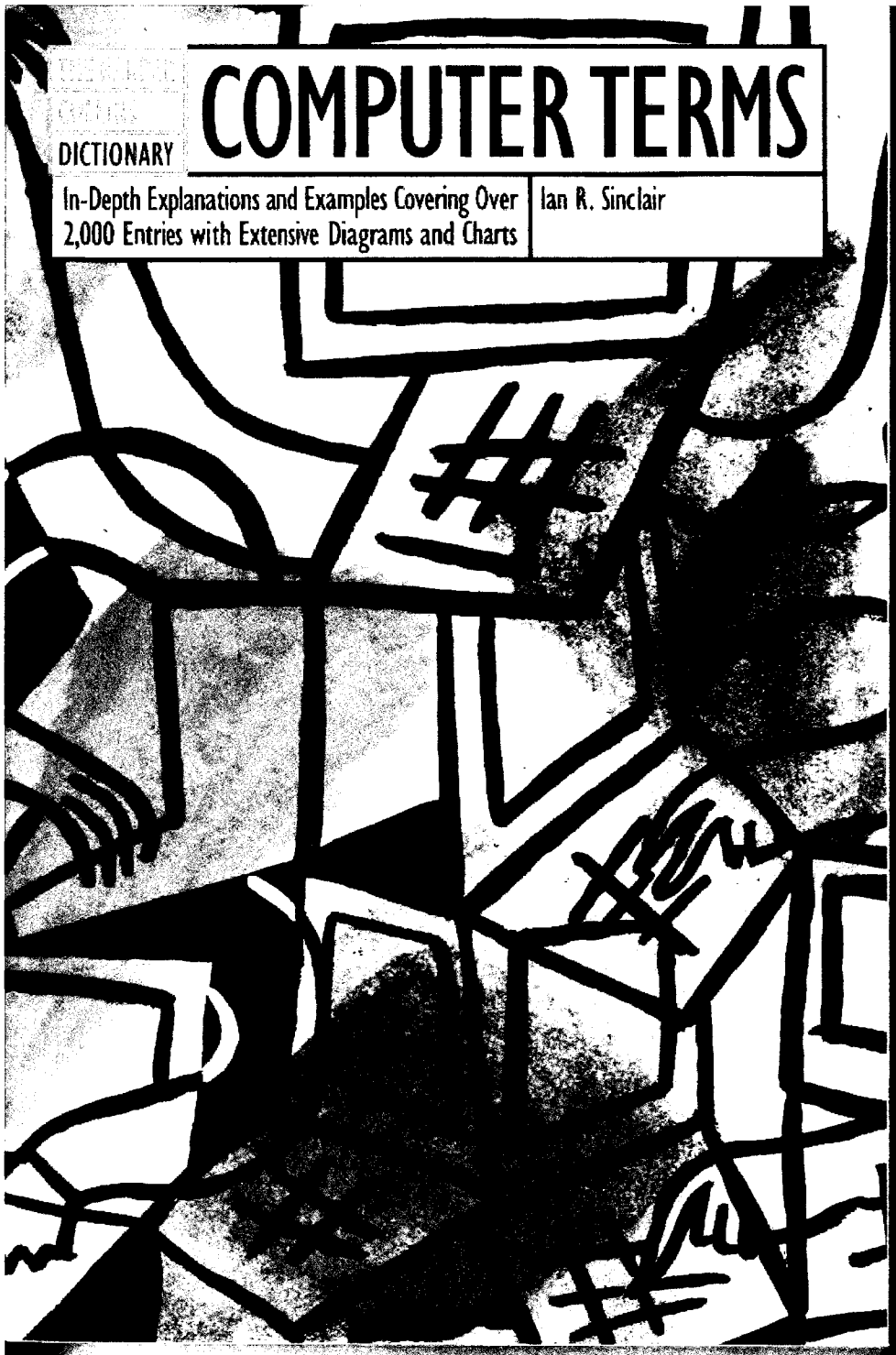
polling A technique whereby a computer checks each of a number of input devices in rotation to see if any data is waiting to be read. Polling depends for its success on each device being checked at least as frequently as the data is arriving; in addition the time spent processing any data that has arrived must not be too long so that data on other devices is missed. Polling

DICTIONARY

COMPUTER TERMS

In-Depth Explanations and Examples Covering Over 2,000 Entries with Extensive Diagrams and Charts

Ian R. Sinclair



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Julian Reitman provided valuable assistance [illegible] his first exposure to computers during the 19[illegible] puters to improve human performanee of [illegible] turned his attention to digital computers for a [illegible] then he has designed, developed, programmed [illegible] about digital computers of many sizes. He is the [illegible] *Simulation Applications* as well as numerous [illegible] University of Connecticut, he teaches courses [illegible] ogy and the history of information processing

[redacted]

numbering its row and its column. 2. a unit of memory, storing one byte, and with a unique ADDRESS number.

centering the placing of a wnrd or phrase in the middle of a printed line during word processing.

Centronics interface a universally accepted INTERFACE for printers. This is the type of interface referred to as *parallel,* meaning one linc is used for each bit of a byte, along with lines for synchronizing signals. The standard was devised by the printer manufacturer Centronics Inc., and it is normal to find that any computer using the Centronics interface will match with any printer using this interface.

CHAIN 1. in some computing languages, a command that forces a program to halt and then load and run another program and make use of the results. The extra program uses variable values from the main program, does *not* replace the original, and is deleted after it has run. 2. on some small machines, a command that loads and runs a program, deleting any other program previously present.

chain search a SEQUENTIAL search through items until the required item or the cnd of the list is reached. This involves items such as RECORDS that can contain POINTERS to other items. A typical example of chain searching is found in information services of the TELETEXT type, so if you look up *travel*, you find references to road, rail, sea, and air. Looking up *air* then produces a list of airports, and so on. Chain searching is acceptable if the computer carries out the search automatically, but can be very slow if each item has to be seleeted manually.

channel a path for data. Also called *stream.* Several operating systems use fixed channels that are identified by number so, for example, PRINT#0 means print on screen, PRINT#8 means print on paper, and PRINT#9 means store on tape or disk. This use of channels makes it possible to have commands, such as PRINT#X, in which the VARIABLE X can be assigned (see ASSIGNATION) numbers that will cause the data to be directed in different ways.

character any letter, digit, punctuation mark, or graphics symbol represented by one ASCII code number. This excludes codes for actions, such as line feed or carriage return, which are represented by code numbers in the range 0 to 31.

character block the set of dots that can be used to make up a character. A screen display of the usual VDU type uses a dot of light that scans across and down the screen. The shape of a character is ob-

page number, current line number, word count, etc. Several word processors allow a choice of status lines, according to the type of information required.

status poll signals sent out by a central processing system to find the status of PERIPHERALS, such as the printer, keyboard, and screen. A status poll, for example, might reveal that the printer is off or out of paper, the screen needs scrolling, or a key is being pressed on the keyboard. See also POLLING, INTERRUPTS.

status word a set of bytes that signals more than one status.

stepping motor a motor that can move in precise and equal steps over a range. Each step is produced by a pulse of current to the motor; and the importance of the stepping motor lies in the fact that the pulses of current can be delivered from a suitable INTERFACE, under computer control. The stepping motor is used, for example, in disk drives to control the position of the disk READ/WRITE head, and in printers to control the movement of a DAISY WHEEL. It also has considerable applications in PLOTTERS and for ROBOTICS.

stop bit the bit that follows the last bit of a byte in SERIAL data transmission and is used as a signal to the receiver that the entire byte has been transmitted. Many PROTOCOLS employ two stop bits. On reception of a stop bit, the microprocessor of the receiver will place the assembled byte into memory, and then set up for another START BIT.

stop code an EMBEDDED COMMAND code used to stop the printer. This might be used, for example, to remove a sheet of headed paper and insert plain paper. Most word-processor programs can be programmed so the stop action is automatic at the end of a page, thus enabling single sheets to be used with the printer.

stop list a list of words that are not to be used. An automatic indexing program, for example, must be provided with a list of words such as "and" and "but" that will not be indexed.

store a memory location or REGISTER.

stream see CHANNEL.

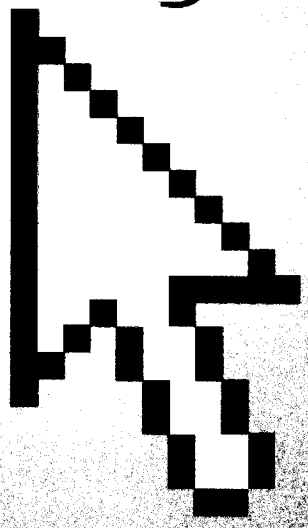
string a DATA TYPE consisting of a set of characters. Most versions of BASIC allow a string to be represented by a variable name followed by the DOLLAR SIGN, with up to 255 characters in the string. Many other languages do not possess a string variable as such. Instead, they use an ARRAY of ASCII codes, which requires DIMENSIONING. Others treat a string as a LIST of characters. See Fig. 68.

Microsoft

Computer Dictionary

Fifth E

- *Fully upda*
  technologi
- *Easy to read,*
- *Definitive cover*
  software, the



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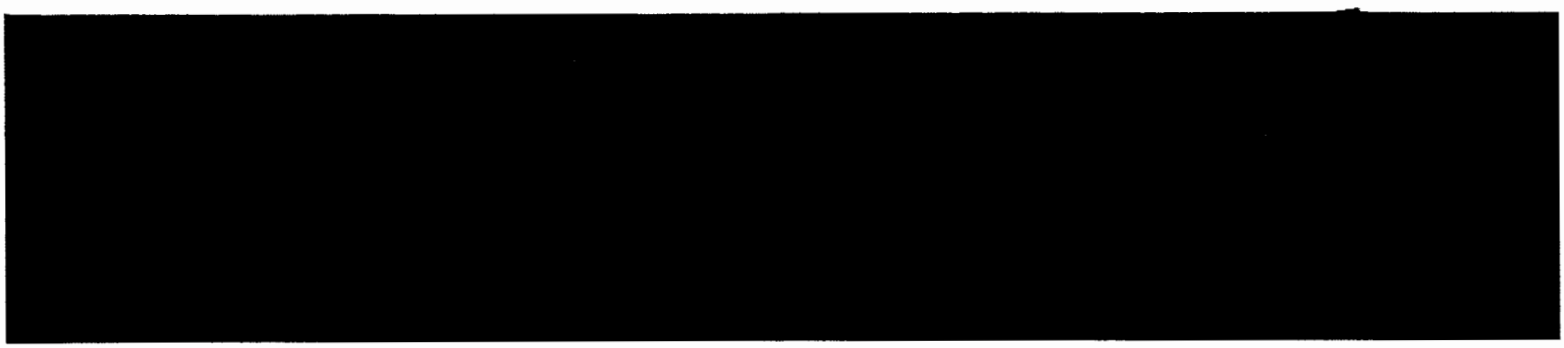


circumstances. Patching is a common means of adding a feature or a function to a program until the next version of the software is released. *Compare* hack (definition 2), kludge (definition 2).

path *n.* **1.** In communications, a link between two nodes in a network. **2.** A route through a structured collection of information, as in a database, a program, or files stored on disk. **3.** In programming, the sequence of instructions a computer carries out in executing a routine. **4.** In information processing, such as the theory underlying expert (deductive) systems, a logical course through the branches of a tree of inferences leading to a conclusion. **5.** In file storage, the route followed by the operating system through the directories in finding, sorting, and retrieving files on a disk. **6.** In graphics, an accumulation of line segments or curves to be filled or drawn.

path menu *n.* In windowed environments, the menu or drop box used to enter the universal naming convention path to a shared network resource.

pathname *n.* In a hierarchical filing system, a listing of the directories or folders that lead from the current directory to a file. *Also called:* directory path.

pattern recognition *n.* **1.** A broad technology describing the ability of a computer to identify patterns. The term usually refers to computer recognition of visual images or sound patterns that have been converted to arrays of numbers. **2.** The recognition of purely mathematical or textual patterns.

Pause key *n.* **1.** A key on a keyboard that temporarily stops the operation of a program or a command. The Pause key is used, for example, to halt scrolling so that a multiscreen listing or document can be read. **2.** Any key that creates a pause in an operation. For example, many game programs have a Pause key, often simply the P key, that temporarily suspends the game.

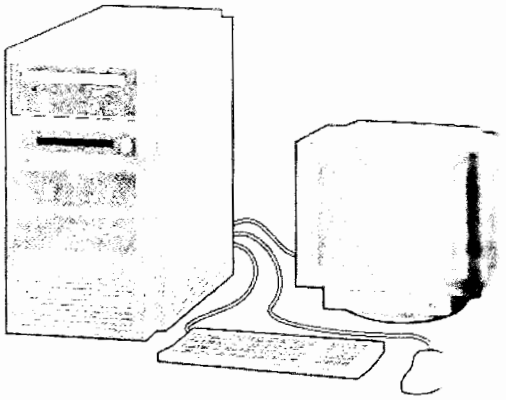
payload *n.* The effects caused by a virus or other malicious code. The payload of a virus may include moving, altering, overwriting, and deleting files, or other destructive activity. A virus or worm may contain more than one payload, each with a separate trigger.

PB *n. See* petabyte.

PB SRAM *n. See* pipeline burst static RAM.

PBX *n.* Acronym for Private Branch Exchange [illegible] matic telephone switching system that enables [illegible] within an organization to place calls to each other [illegible] going through the public telephone network. Users [illegible] also place calls to outside numbers.

PC *n.* **1.** A microcomputer that conforms to the [illegible] developed by IBM for personal computers, which [illegible] microprocessor in the Intel 80x86 family (or compatible) [illegible] and can execute the BIOS. See the illustration. *See also* 8086, BIOS, clone, IBM PC. **2.** A computer in the [illegible] sonal Computer line. *Also called:* IBM PC. *See also* compatible (definition 1), personal computer.



PC.

PCB *n. See* printed circuit board.

PC board *n. See* printed circuit board.

PC Card *n.* An add-in card that conforms to the PC [illegible] specification. A PC Card is a removable device, [illegible] mately the same size as a credit card, that is designed [illegible] plug into a PCMCIA slot. Release 1 of the PCMCIA [illegible] ification, introduced in June 1990, specified a Type [illegible] that is 3.3 millimeters thick and is intended to be used [illegible] marily as a memory-related peripheral. Release 2 of the [illegible] PCMCIA specification, introduced in September 1992, [illegible] specifies both a 5-millimeter-thick Type II card and a [illegible] 10.5-millimeter-thick Type III card. Type II cards accommodate devices such as modem, fax, and network cards. Type III cards accommodate devices that require more space, such as wireless communications devices and rotating storage media (such as hard disks). *See also* PCMCIA, PCMCIA slot.