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## The ASCII Character Set

The American Standard Code for Information Interchange or ASCII assigns values between 0 and 255 for upper and lower case letters, numeric digits, punctuation marks and other symbols. ASCII characters can be split into the following sections:

- ❑ 0 – 31 Control codes
- ❑ 32 – 127 Standard, implementation-independent characters
- ❑ 128 – 255 Special symbols, international character sets – generally, non-standard characters.

### Control Codes : ASCII Characters 0 - 31

The following table lists and describes the first 32 ASCII characters, often referred to as control codes. The columns show the decimal and hexadecimal ASCII values for each code along with their abbreviated and full names. Descriptions are given to those most in use today.

| Decimal | Octal | Hexadecimal | Code | Description         |
|---------|-------|-------------|------|---------------------|
| 000     | 000   | 00          | NUL  | Null                |
| 001     | 001   | 01          | SOH  | Start Of Heading    |
| 002     | 002   | 02          | STX  | Start of TeXt       |
| 003     | 003   | 03          | ETX  | End of TeXt         |
| 004     | 004   | 04          | EOT  | End Of Transmission |
| 005     | 005   | 05          | ENQ  | ENQuiry             |
| 006     | 006   | 06          | ACK  | ACKnowledge         |

*Table continued on following page*

| Decimal | Octal | Hexadecimal | Code | Description   |
|---------|-------|-------------|------|---|
| 007     | 007   | 07          | BEL  | BELL. Caused teletype machines to ring a bell. Causes a beep in many common terminals and terminal emulation programs.  |
| 008     | 010   | 08          | BS   | BackSpace. Moves the cursor move backwards (left) one space.  |
| 009     | 011   | 09          | HT   | Horizontal Tab. Moves the cursor right to the next tab stop. The spacing of tab stops is dependent on the output device, but is often either 8 or 10 characters wide. |
| 010     | 012   | 0A          | LF   | Line Feed. Moves the cursor to a new line. On Unix systems, moves to a new line AND all the way to the left.  |
| 011     | 013   | 0B          | VT   | Vertical Tab  |
| 012     | 014   | 0C          | FF   | Form Feed. Advances paper to the top of the next page (if the output device is a printer).  |
| 013     | 015   | 0D          | CR   | Carriage Return. Moves the cursor all the way to the left, but does not advance to the next line.   |
| 014     | 016   | 0E          | SO   | Shift Out   |
| 015     | 017   | 0F          | SI   | Shift In  |
| 016     | 020   | 10          | DLE  | Data Link Escape  |
| 017     | 021   | 11          | DC1  | Device Control 1  |
| 018     | 022   | 12          | DC2  | Device Control 2  |
| 019     | 023   | 13          | DC3  | Device Control 3  |
| 020     | 024   | 14          | DC4  | Device Control 4  |
| 021     | 025   | 15          | NAK  | Negative AcKnowledge  |
| 022     | 026   | 16          | SYN  | SYNchronous idle  |
| 023     | 027   | 17          | ETB  | End of Transmission Block   |
| 024     | 030   | 18          | CAN  | CANcel  |
| 025     | 031   | 19          | EM   | End of Medium   |
| 026     | 032   | 1A          | SUB  | SUBstitute  |
| 027     | 033   | 1B          | ESC  | ESCape  |
| 028     | 034   | 1C          | FS   | File Separator  |

| Decimal | Octal | Hexadecimal | Code | Description      |
|---------|-------|-------------|------|------------------|
| 029     | 035   | 1D          | GS   | Group Separator  |
| 030     | 036   | 1E          | RS   | Record Separator |
| 031     | 037   | 1F          | US   | Unit Separator   |

## The Standard ASCII Characters : 32 - 127

ASCII Characters 32 - 127 are the standard, implementation-independent alphanumeric characters we work with every day. The tables below show the characters along with both their decimal and hexadecimal ASCII values.

### Characters 32 - 64

The first table, which contains characters 32 - 64, contains the majority of the standard symbolic characters and the numbers from zero to nine.

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 032     | 040   | 20          | Space     | 049     | 061   | 31          | 1         |
| 033     | 041   | 21          | !         | 050     | 062   | 32          | 2         |
| 034     | 042   | 22          | "         | 051     | 063   | 33          | 3         |
| 035     | 043   | 23          | #         | 052     | 064   | 34          | 4         |
| 036     | 044   | 24          | \$        | 053     | 065   | 35          | 5         |
| 037     | 045   | 25          | %         | 054     | 066   | 36          | 6         |
| 038     | 046   | 26          | &         | 055     | 067   | 37          | 7         |
| 039     | 047   | 27          | '         | 056     | 070   | 38          | 8         |
| 040     | 050   | 28          | (         | 057     | 071   | 39          | 9         |
| 041     | 051   | 29          | )         | 058     | 072   | 3A          | :         |
| 042     | 052   | 2A          | *         | 059     | 073   | 3B          | ;         |
| 043     | 053   | 2B          | +         | 060     | 074   | 3C          | <         |
| 044     | 054   | 2C          | ,         | 061     | 075   | 3D          | =         |
| 045     | 055   | 2D          | -         | 062     | 076   | 3E          | >         |
| 046     | 056   | 2E          | .         | 063     | 077   | 3F          | ?         |
| 047     | 057   | 2F          | /         | 064     | 100   | 40          | @         |
| 048     | 060   | 30          | 0         |         |       |             |           |

**Characters 65 - 127**

The second table, which contains characters 65 - 127, contains the standard Latin alphabet characters both lower and upper case, separated only by a few characters at 91 - 96 and 123 - 127.

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 065     | 101   | 41          | A         | 097     | 141   | 61          | a         |
| 066     | 102   | 42          | B         | 098     | 142   | 62          | b         |
| 067     | 103   | 43          | C         | 099     | 143   | 63          | c         |
| 068     | 104   | 44          | D         | 100     | 144   | 64          | d         |
| 069     | 105   | 45          | E         | 101     | 145   | 65          | e         |
| 070     | 106   | 46          | F         | 102     | 146   | 66          | f         |
| 071     | 107   | 47          | G         | 103     | 147   | 67          | g         |
| 072     | 110   | 48          | H         | 104     | 150   | 68          | h         |
| 073     | 111   | 49          | I         | 105     | 151   | 69          | i         |
| 074     | 112   | 4A          | J         | 106     | 152   | 6A          | j         |
| 075     | 113   | 4B          | K         | 107     | 153   | 6B          | k         |
| 076     | 114   | 4C          | L         | 108     | 154   | 6C          | l         |
| 077     | 115   | 4D          | M         | 109     | 155   | 6D          | m         |
| 078     | 116   | 4E          | N         | 110     | 156   | 6E          | n         |
| 079     | 117   | 4F          | O         | 111     | 157   | 6F          | o         |
| 080     | 120   | 50          | P         | 112     | 160   | 70          | p         |
| 081     | 121   | 51          | Q         | 113     | 161   | 71          | q         |
| 082     | 122   | 52          | R         | 114     | 162   | 72          | r         |
| 083     | 123   | 53          | S         | 115     | 163   | 73          | s         |
| 084     | 124   | 54          | T         | 116     | 164   | 74          | t         |
| 085     | 125   | 55          | U         | 117     | 165   | 75          | u         |
| 086     | 126   | 56          | V         | 118     | 166   | 76          | v         |
| 087     | 127   | 57          | W         | 119     | 167   | 77          | w         |
| 088     | 130   | 58          | X         | 120     | 170   | 78          | x         |
| 089     | 131   | 59          | Y         | 121     | 171   | 79          | y         |
| 090     | 132   | 5A          | Z         | 122     | 172   | 7A          | z         |

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 091     | 133   | 5B          | [         | 123     | 173   | 7B          | {         |
| 092     | 134   | 5C          | \         | 124     | 174   | 7C          |           |
| 093     | 135   | 5D          | ]         | 125     | 175   | 7D          | }         |
| 094     | 136   | 5E          | ^         | 126     | 176   | 7E          | ~         |
| 095     | 137   | 5F          | _         | 127     | 177   | 7F          | delete    |
| 096     | 140   | 60          | '         |         |       |             |           |

## The Non-Standard ASCII Characters : 128 - 255

The second half of the ASCII table holds the non-standard extension set of characters which may vary depending which computer system you may be using. One common – but in no way definitive – example of this extended set is as follows.

### Characters 128 - 191

This first table contains characters 128 - 191, abstract symbols that appear in text from time to time.

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character          |
|---------|-------|-------------|-----------|---------|-------|-------------|--------------------|
| 128     | 200   | 80          | •         | 160     | 240   | A0          | non-breaking space |
| 129     | 201   | 81          | •         | 161     | 241   | A1          | ı                  |
| 130     | 202   | 82          | ,         | 162     | 242   | A2          | ¢                  |
| 131     | 203   | 83          | f         | 163     | 243   | A3          | £                  |
| 132     | 204   | 84          | „         | 164     | 244   | A4          | ¤                  |
| 133     | 205   | 85          | ...       | 165     | 245   | A5          | ¥                  |
| 134     | 206   | 86          | †         | 166     | 246   | A6          | ı                  |
| 135     | 207   | 87          | ‡         | 167     | 247   | A7          | §                  |
| 136     | 210   | 88          | ^         | 168     | 250   | A8          | ¨                  |
| 137     | 211   | 89          | ‰         | 169     | 251   | A9          | ©                  |
| 138     | 212   | 8A          | Š         | 170     | 252   | AA          | ª                  |
| 139     | 213   | 8B          | <         | 171     | 253   | AB          | «                  |

*Table continued on following page*

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 140     | 214   | 8C          | Ě         | 172     | 254   | AC          | ¬         |
| 141     | 215   | 8D          | •         | 173     | 255   | AD          | -         |
| 142     | 216   | 8E          | Ž         | 174     | 256   | AE          | ®         |
| 143     | 217   | 8F          | •         | 175     | 257   | AF          | -         |
| 144     | 220   | 90          | •         | 176     | 260   | B0          | °         |
| 145     | 221   | 91          | '         | 177     | 261   | B1          | ±         |
| 146     | 222   | 92          | '         | 178     | 262   | B2          | ²         |
| 147     | 223   | 93          | "         | 179     | 263   | B3          | ³         |
| 148     | 224   | 94          | •         | 180     | 264   | B4          | ´         |
| 149     | 225   | 95          | •         | 181     | 265   | B5          | µ         |
| 150     | 226   | 96          | –         | 182     | 266   | B6          | ¶         |
| 151     | 227   | 97          | –         | 183     | 267   | B7          | ·         |
| 152     | 230   | 98          | ˘         | 184     | 270   | B8          | ¸         |
| 153     | 231   | 99          | ™         | 185     | 271   | B9          | ¹         |
| 154     | 232   | 9A          | š         | 186     | 272   | BA          | º         |
| 155     | 233   | 9B          | ›         | 187     | 273   | BB          | »         |
| 156     | 234   | 9C          | œ         | 188     | 274   | BC          | ¼         |
| 157     | 235   | 9D          | •         | 189     | 275   | BD          | ½         |
| 158     | 236   | 9E          | ÿ         | 190     | 276   | BE          | ¾         |
| 159     | 237   | 9F          | ÿ         | 191     | 277   | BF          | ¿         |

### Characters 192 - 255

The second table contains characters 192 - 255, variously accented alphabetical characters.

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 192     | 300   | C0          | À         | 224     | 340   | E0          | à         |
| 193     | 301   | C1          | Á         | 225     | 341   | E1          | á         |
| 194     | 302   | C2          | Â         | 226     | 342   | E2          | â         |
| 195     | 303   | C3          | Ã         | 227     | 343   | E3          | ã         |
| 196     | 304   | C4          | Ä         | 228     | 344   | E4          | ä         |

| Decimal | Octal | Hexadecimal | Character | Decimal | Octal | Hexadecimal | Character |
|---------|-------|-------------|-----------|---------|-------|-------------|-----------|
| 197     | 305   | C5          | Å         | 229     | 345   | E5          | å         |
| 198     | 306   | C6          | Æ         | 230     | 346   | E6          | æ         |
| 199     | 307   | C7          | Ç         | 231     | 347   | E7          | ç         |
| 200     | 310   | C8          | È         | 232     | 350   | E8          | è         |
| 201     | 311   | C9          | É         | 233     | 351   | E9          | é         |
| 202     | 312   | CA          | Ê         | 234     | 352   | EA          | ê         |
| 203     | 313   | CB          | Ë         | 235     | 353   | EB          | ë         |
| 204     | 314   | CC          | Ì         | 236     | 354   | EC          | ì         |
| 205     | 315   | CD          | Í         | 237     | 355   | ED          | í         |
| 206     | 316   | CE          | Î         | 238     | 356   | EE          | î         |
| 207     | 317   | CF          | Ï         | 239     | 357   | EF          | ï         |
| 208     | 320   | D0          | Ð         | 240     | 360   | F0          | ð         |
| 209     | 321   | D1          | Ñ         | 241     | 361   | F1          | ñ         |
| 210     | 322   | D2          | Ò         | 242     | 362   | F2          | ò         |
| 211     | 323   | D3          | Ó         | 243     | 363   | F3          | ó         |
| 212     | 324   | D4          | Ô         | 244     | 364   | F4          | ô         |
| 213     | 325   | D5          | Ö         | 245     | 365   | F5          | ö         |
| 214     | 326   | D6          | Ö         | 246     | 366   | F6          | ö         |
| 215     | 327   | D7          | ×         | 247     | 367   | F7          | ÷         |
| 216     | 330   | D8          | Ø         | 248     | 370   | F8          | ø         |
| 217     | 331   | D9          | Ù         | 249     | 371   | F9          | ù         |
| 218     | 332   | DA          | Ú         | 250     | 372   | FA          | ú         |
| 219     | 333   | DB          | Û         | 251     | 373   | FB          | û         |
| 220     | 334   | DC          | Ü         | 252     | 374   | FC          | ü         |
| 221     | 335   | DD          | Ý         | 253     | 375   | FD          | ý         |
| 222     | 336   | DE          | Þ         | 254     | 376   | FE          | þ         |
| 223     | 337   | DF          | ß         | 255     | 377   | FF          |           |

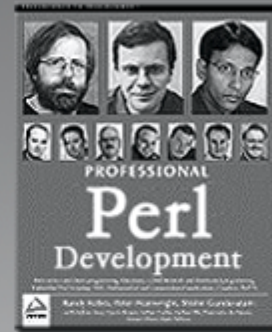
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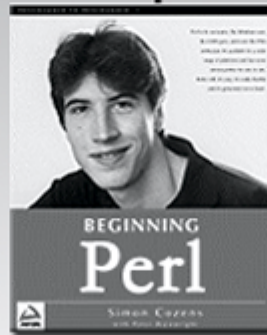
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