

Selected Java Date & Time Format Specifiers
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This is a revised and simplified version of the Java Format class documentation. It applies to the `java.util.Formatter.format()`, `java.io.PrintStream.format()` and `java.io.PrintStream.printf()` methods.

Format String Syntax

Every method which produces formatted output requires a *format string* and an *argument list*. The format string is a *String* which may contain fixed text and one or more embedded *format specifiers*. Consider the following example:

```
Calendar c = ...;  
String s = String.format("Duke's Birthday: %1$tm %1$te,%1$tY", c);
```

This format string is the first argument to the `format` method. It contains three format specifiers "`%1$tm`", "`%1$te`", and "`%1$tY`" which indicate how the arguments should be processed and where they should be inserted in the text. The remaining portions of the format string are fixed text including "Dukes Birthday: " and any other spaces or punctuation. The argument list consists of all arguments passed to the method after the format string. In the above example, the argument list is of size one and consists of the new *Calendar* object. The format specifiers for types which are used to represent dates and times have the following syntax (items in square brackets, "[]" are optional):

```
%[argument_index$][flags][width]conversion
```

The optional *argument_index*, *flags* and *width* are defined as above.

The required *conversion* is a two character sequence. The first character is 't' or 'T'. The second character indicates the format to be used.

Date/Time Conversions

The following date and time conversion suffix characters are defined for the 't' and 'T' conversions. Conversion types are provided to access common GNU, POSIX and Java-specific functionality.

The following conversion characters are used for formatting times:

- 'H' Hour of the day for the 24-hour clock, formatted as two digits with a leading zero as necessary i.e. 00 - 23.
- 'I' Hour for the 12-hour clock, formatted as two digits with a leading zero as necessary, i.e. 01 - 12.
- 'k' Hour of the day for the 24-hour clock, i.e. 0 - 23.
- 'l' Hour for the 12-hour clock, i.e. 1 - 12.
- 'M' Minute within the hour formatted as two digits with a leading zero as necessary, i.e. 00 - 59.
- 'S' Seconds within the minute, formatted as two digits with a leading zero as necessary, i.e. 00 - 60 ("60" is a special value required to support leap seconds).
- 'L' Millisecond within the second formatted as three digits with leading zeros as necessary, i.e. 000 - 999.
- 'N' Nanosecond within the second, formatted as nine digits with leading zeros as necessary, i.e. 000000000 - 999999999.
- 'P' Locale-specific morning or afternoon marker in lower case, e.g. "am" or "pm". Use of the conversion prefix 'T' forces this output to upper case.
- 'z' RFC 822 style numeric time zone offset from GMT, e.g. -0800.
- 'Z' A string representing the abbreviation for the time zone. The Formatter's locale will supersede the locale of the argument (if any).
- 's' Seconds since the beginning of the epoch starting at 1 January 1970 00:00:00 UTC, i.e. Long.MIN_VALUE/1000 to Long.MAX_VALUE/1000.
- 'Q' Milliseconds since the beginning of the epoch starting at 1 January 1970 00:00:00 UTC, i.e. Long.MIN_VALUE to Long.MAX_VALUE.

The following conversion characters are used for formatting dates:

- 'B' Locale-specific full month name, e.g. "January", "February".
- 'b' Locale-specific abbreviated month name, e.g. "Jan", "Feb".
- 'h' Same as 'b'.
- 'A' Locale-specific full name of the day of the week, e.g. "Sunday", "Monday"
- 'a' Locale-specific short name of the day of the week, e.g. "Sun", "Mon"

- 'C' Four-digit year divided by 100, formatted as two digits with leading zero as necessary, i.e. 00 - 99
- 'Y' Year, formatted as at least four digits with leading zeros as necessary, e.g. 0092 equals 92 CE for the Gregorian calendar.
- 'y' Last two digits of the year, formatted with leading zeros as necessary, i.e. 00 - 99.
- 'j' Day of year, formatted as three digits with leading zeros as necessary, e.g. 001 - 366 for the Gregorian calendar.
- 'm' Month, formatted as two digits with leading zeros as necessary, i.e. 01 - 13.
- 'd' Day of month, formatted as two digits with leading zeros as necessary, i.e. 01 - 31
- 'e' Day of month, formatted as two digits, i.e. 1 - 31.

The following conversion characters are used for formatting common date/time compositions.

- 'R' Time formatted for the 24-hour clock as "%tH:%tM"
- 'T' Time formatted for the 24-hour clock as "%tH:%tM:%tS".
- 'r' Time formatted for the 12-hour clock as "%tI:%tM:%tS %Tp". The location of the morning or afternoon marker ('%Tp') may be locale-dependent.
- 'D' Date formatted as "%tm/%td/%ty".
- 'F' ISO 8601 complete date formatted as "%tY-%tm-%td".
- 'c' Date and time formatted as "%ta %tb %td %tT %tZ %tY", e.g. "Sun Jul 20 16:17:00 EDT 1969".

Any characters not explicitly defined as date/time conversion suffixes are illegal and are reserved for future extensions.

Width

The width is the minimum number of characters to be written to the output. For the line separator conversion, width is not applicable; if it is provided, an exception will be thrown.

Flags

The following table summarizes the supported flags. y means the flag is supported for the indicated argument types.

Flag	General	Character	Integral	Floating Point	Date/Time	Description
'_'	y	y	y	y	y	The result will be left-justified.
'#'	y	-	y	y	-	The result should use a conversion-dependent alternate form
'+'	-	-	y	y	-	The result will always include a sign
' '	-	-	y	y	-	The result will include a leading space for positive values
'0'	-	-	y	y	-	The result will be zero-padded
'.'	-	-	y	y	-	The result will include locale-specific grouping separators
'('	-	-	y	y	-	The result will enclose negative numbers in parentheses