



Java Programming I

Session 4

DATE AND TIME

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Agenda

- **Date and Time basics**
- **Parsing**
- **Operations**
- **Exercise**

Representing Time

Time through primitives

The Unix epoch

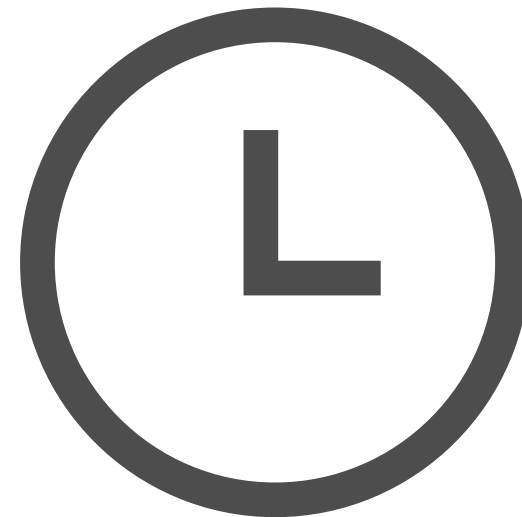
0

GMT: Thursday, January 1, 1970 12:00:00 AM

Seconds since

1511380200

GMT: Wednesday, November 22, 2017 7:50:00 PM



Computers are fast

A lot can happen in a second

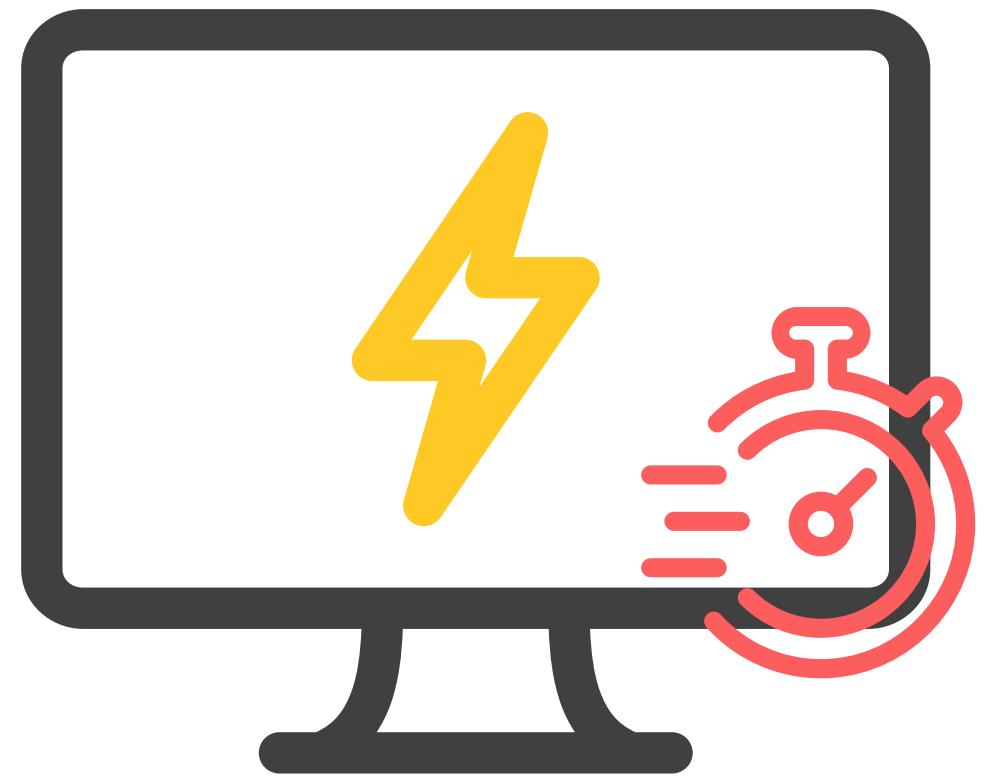
Java counts in Milliseconds

Milliseconds since

1511380200000

GMT: Wednesday, November 22, 2017 7:50:00 PM

```
Date now = new Date();  
Date other = new Date(1511380200000l);
```



But....dates aren't numbers

I have a string that represents it

```
DateFormat formatter = new SimpleDateFormat("MM/dd/yyyy");  
Date time_machine_invention = formatter.parse("11/05/1955");
```

Letter	Date or Time Component	Presentation	Examples
y	Year	Year	1996; 96
M	Month in year (context sensitive)	Month	July; Jul; 07
w	Week in year	Number	27
W	Week in month	Number	2
d	Day in month	Number	10
E	Day name in week	Text	Tuesday; Tue
a	Am/pm marker	Text	PM
H	Hour in day (0-23)	Number	0
h	Hour in am/pm (1-12)	Number	12
m	Minute in hour	Number	30
s	Second in minute	Number	55
S	Millisecond	Number	978
z	Time zone	General time zone	PST; GMT-08:00

In a little while

relative to other time

```
DateFormat formatter = new SimpleDateFormat("MM/dd/yyyy");  
Date nov_5 = formatter.parse("11/05/2017");  
Calendar cal = Calendar.getInstance();  
cal.setTime(nov_5);  
cal.add(Calendar.DATE, 1);  
Date a_day_ago = cal.getTime();
```

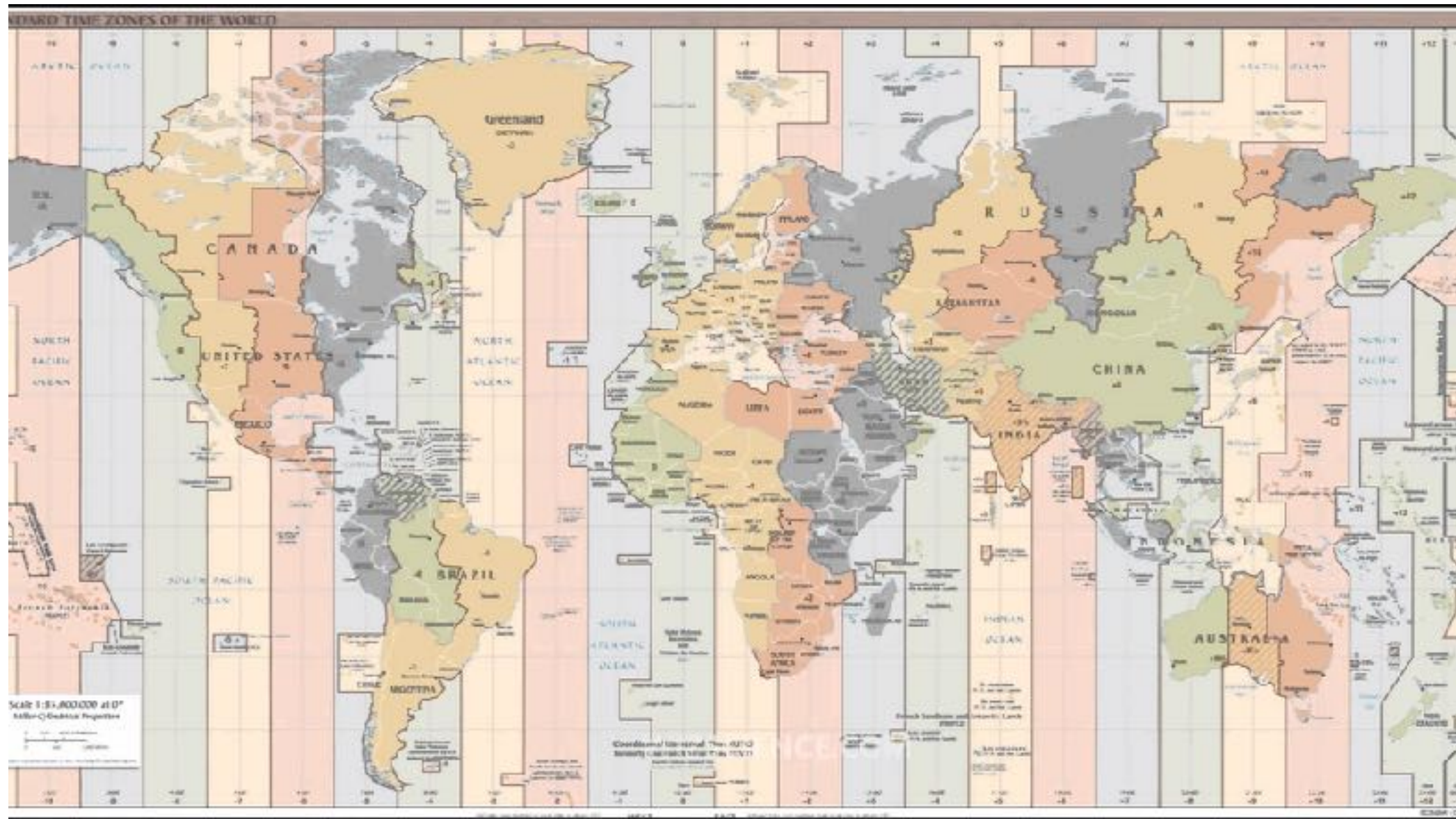
Back to milliseconds

Comparing dates

```
DateFormat formatter = new SimpleDateFormat("MM/dd/yyyy");  
Date nov_5 = formatter.parse("11/05/2017");  
Date a_yr_before = formatter.parse("11/05/2016");  
  
System.out.println(nov_5.compareTo(a_yr_before));  
long diff = nov_5.getTime() - a_yr_before.getTime();  
long days_since = diff/1000/60/60/24;
```

Timezones

it's 5 o'clock somewhere



TimeZone Conversion

Switching back and forth

```
Instant instant = new Date().toInstant();  
TimeZone tz = TimeZone.getTimeZone("America/New York");  
LocalDateTime localDateTime = LocalDateTime.ofInstant(instant, tz.toZoneId());
```

Instant - UTC time in Nanoseconds

ZoneId - A TimeZone

LocalDateTime - is date representation not zoned

Exercise 1

Countdown to end of class



Homework

Parking

I parked for 4 hours 10 minutes at the 3rd Street Promenade, the rates are defined by:

First 90 minutes free, \$1.25 for the next hour, \$1.85 each additional 30 minutes, \$17.50 daily maximum

Write code that using this logic will tell me how much I will pay