

Time zones



It's always high noon somewhere in the world –
or why time is relatively (complicated)



Team inovex

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Agenda

- Why time zones
- Which time zones
- time zone database
- How to handle time zones



Why Timezones?



Before Time Zones

- Local Solar Time (LST)
 - The passage of time based on the position of the Sun in the sky
 - Variations in Solar Days (the time between two successive solar noons)
- Local Mean Time (LMT) (starting 14th Century)
 - Invention of Clocks
 - Each day is exactly 24 hours long
 - Each city had a different LMT defined by its longitude



Time Zone Beginnings

- Needed for standardized train schedules
- Greenwich Mean Time (GMT) was adopted across Great Britain by the Railway Clearing House in 1847
- In 1880 GMT was legally adopted throughout Great Britain
- In 1884 the International Meridian Conference established Universal Time

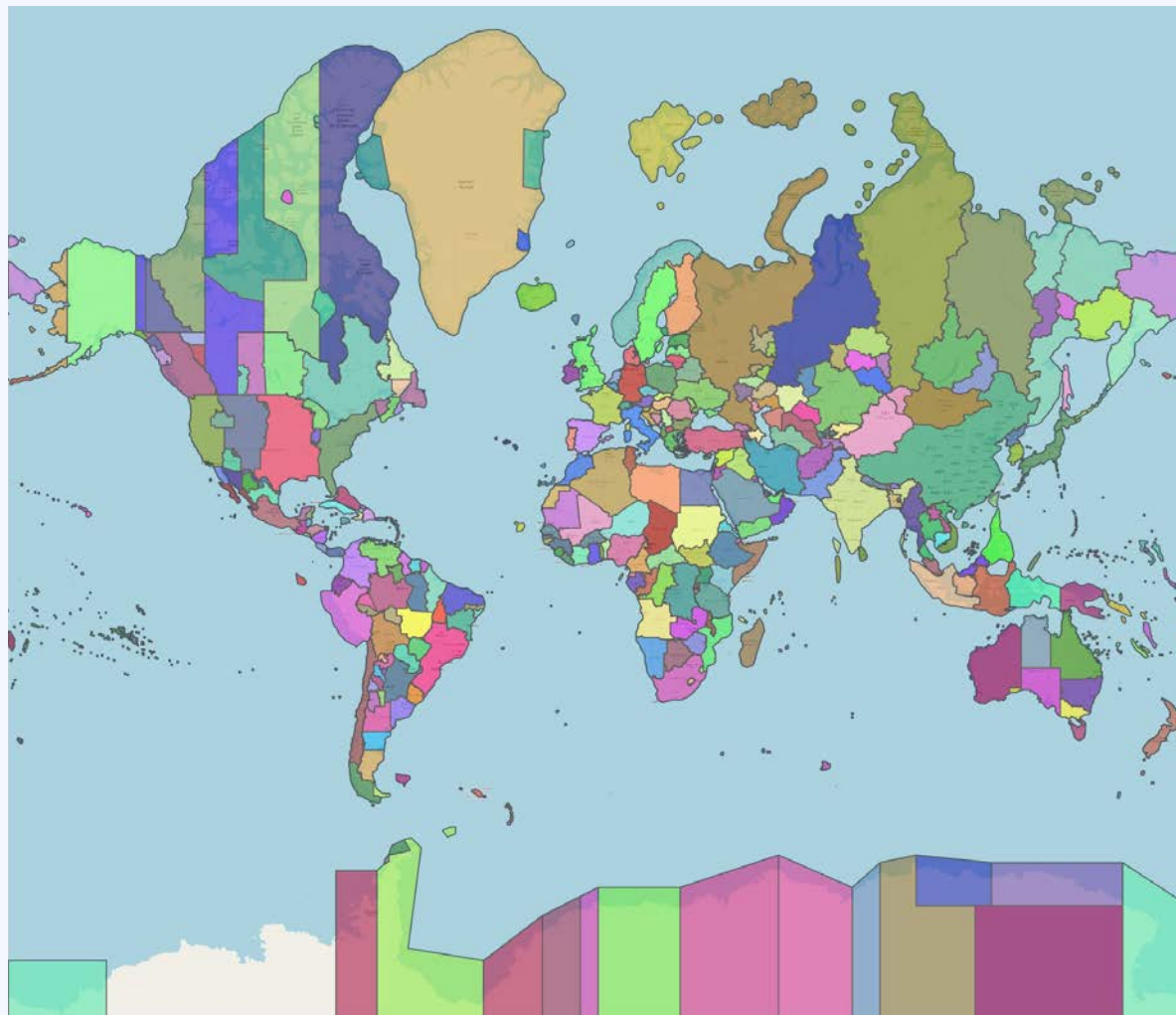
→ Countries adopted time zones over the next decades individually



What time zones are there?

Many more than you thought

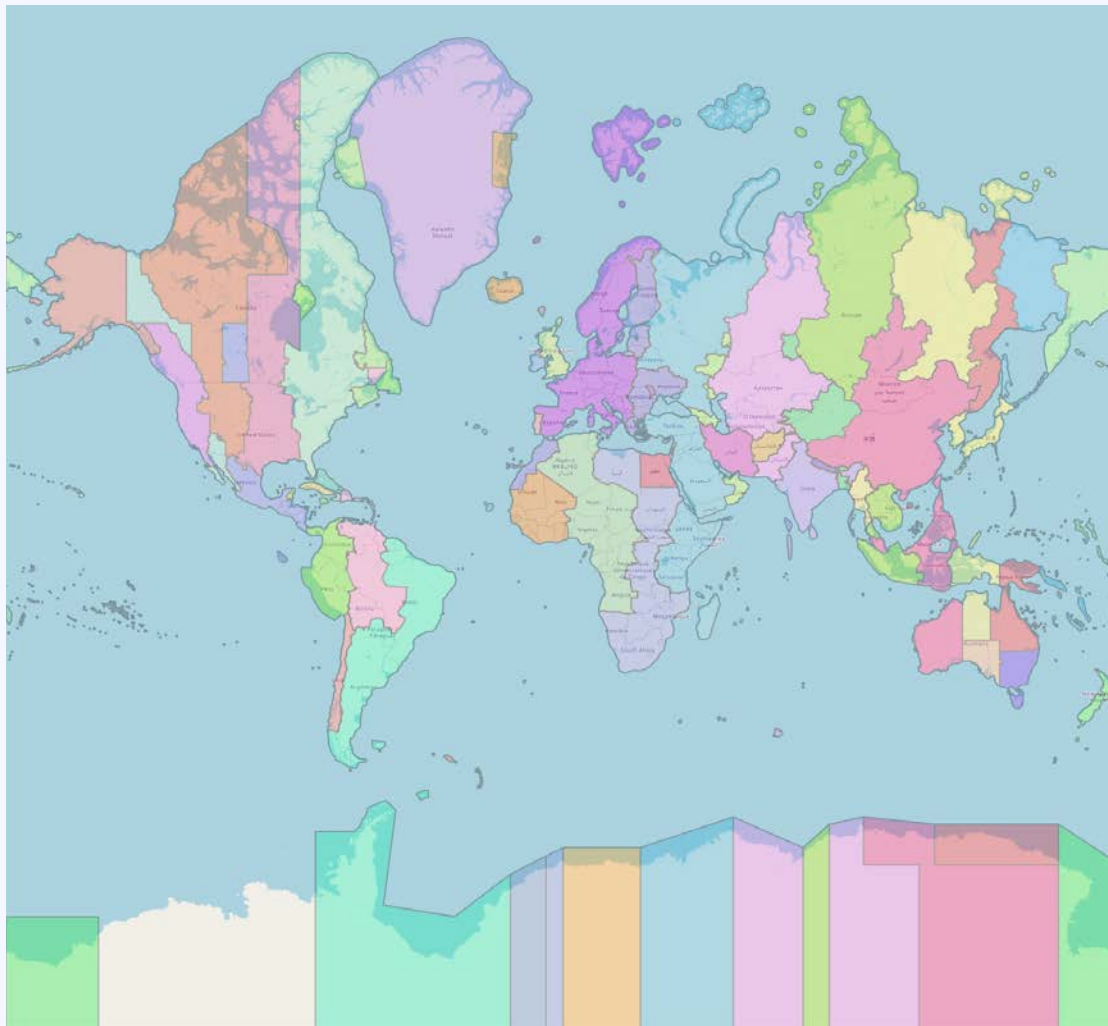




Total

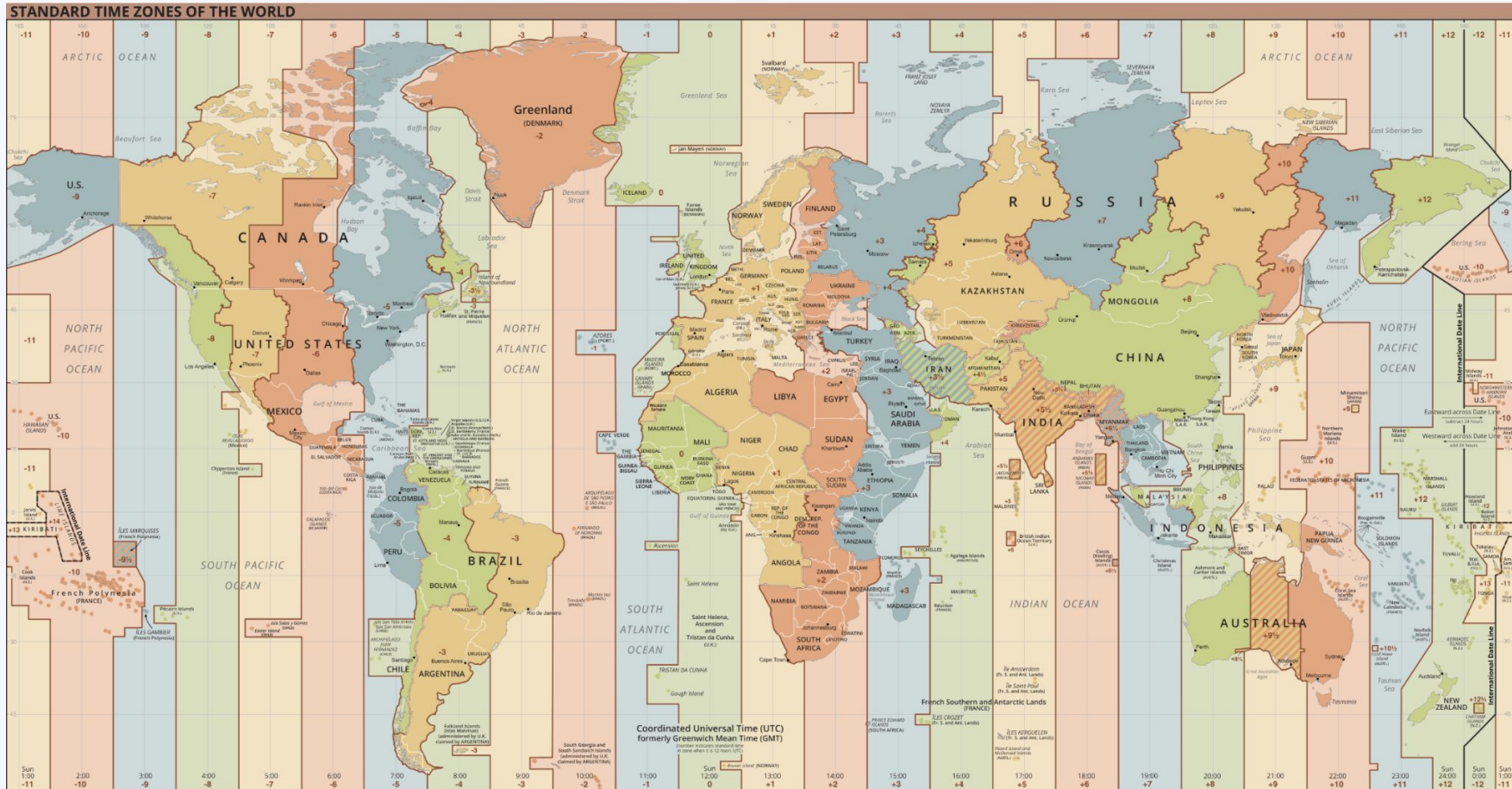
America	143
Asia	82
Europe	58
Africa	52
Pacific	38
Antarctica	11
Australia	11
Indian	11
Atlantic	10
Arctic	1
Etc	1

Total 418



Now

America	18
Asia	15
Pacific	12
Europe	7
Australia	6
Africa	5
Atlantic	2
Etc	1
Antarctica	1
Total	67



Source: https://en.m.wikipedia.org/wiki/File:World_Time_Zones_Map.png



Time Zones

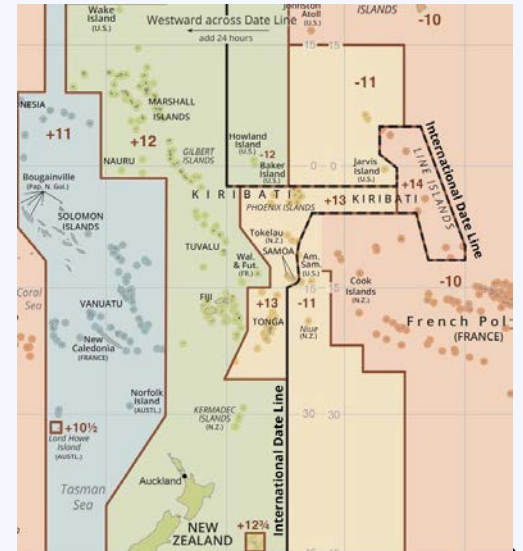
- Coordinated Universal Time (UTC) UTC+00:00
- Zulu Time (Z) UTC+00:00
- Greenwich mean time (GMT) UTC+00:00
- Central European Time (CET) UTC+01:00
- Central European **Summer** Time (CEST) UTC+02:00
- Amazon Time (AMT) UTC-04:00
- Armenia Time (AMT) UTC+04:00
- Réunion Time (RET) UTC+04:00
- Indian Standard Time (IST) UTC+05:30
- Nepal Time (NPT) UTC+05:45
- International Date Line West (IDLW) UTC-12:00
- Line Island Time (LINT) UTC+14:00



time zones - who uses which time zone



- Which time zones are used, are decided by the countries
 - **Germany:** *Gesetz über die Einheiten im Messwesen und die Zeitbestimmung (Einheiten- und Zeitgesetz - EinhZeitG) § 4 Gesetzliche Zeit & EU Directive 2000/84/EC*
 - **USA:** *15 U.S. Code § 260*
- Countries also change their time zones
 - **Spain** moved to CET to align with European Market
 - **Greece** moved from EET to CET and back
 - **Kiribati**
 - Gilbert Islands UTC+12 ⇨ UTC+12
 - Phoenix Islands UTC-11 ⇨ UTC+13
 - Line Islands UTC-10 ⇨ UTC+14



time zones - not all are “legal”



Australia/Eucla Central Western Time (CWT)

[BBC](#): “So are Nepal and a strip of Western Australia which, although home to just 200 people, has its own, unofficial time zone - Central Western Time - some eight-and-three-quarter hours ahead of GMT”

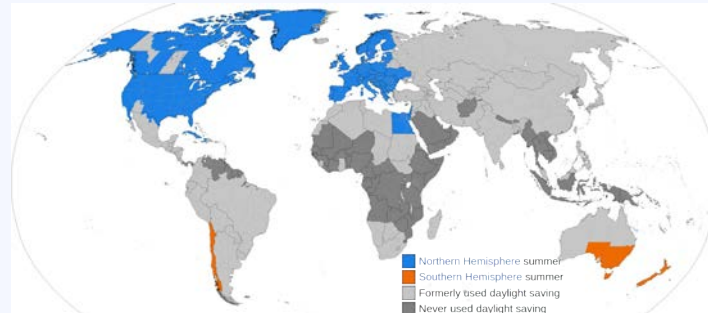


Daylight Saving Time (DST)

Adjusting Clocks for More Daylight

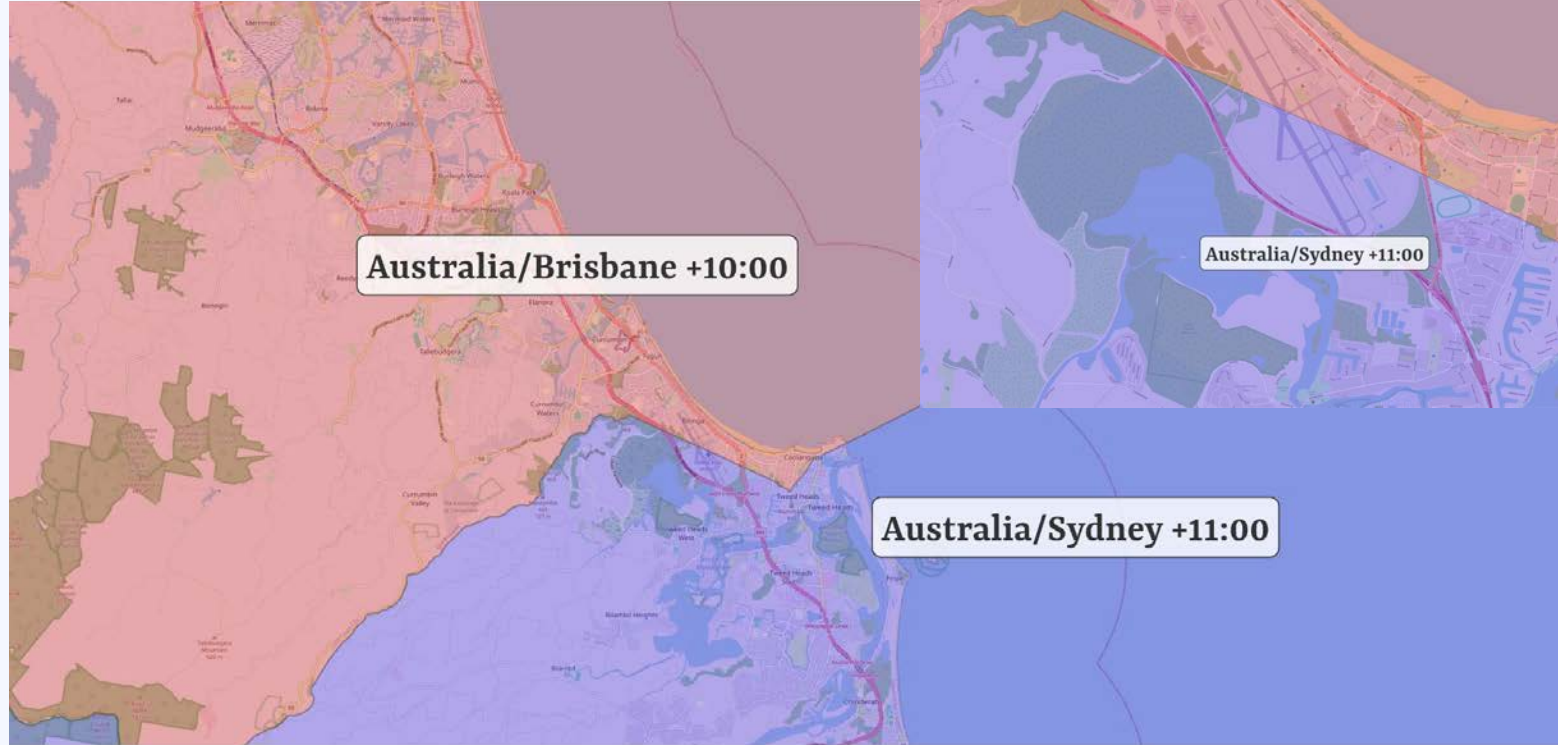
- Typically clocks move 1 hour forward in spring and 1 hour back in autumn (some countries also switched 4 times a year 🇷🇺)
- **Purpose:** extend evening daylight, originally for energy savings (first national adoption during WW1, comeback during the 1970s)
- Northern Hemisphere e.g.: EU, USA (- 🇺🇸 & 🇺🇮)
Southern Hemisphere: Australia, New Zealand, Chile
- DSTs sometimes get abolished, reintroduced and abolished again (China)

🚨 DST creates ambiguous time 🚨



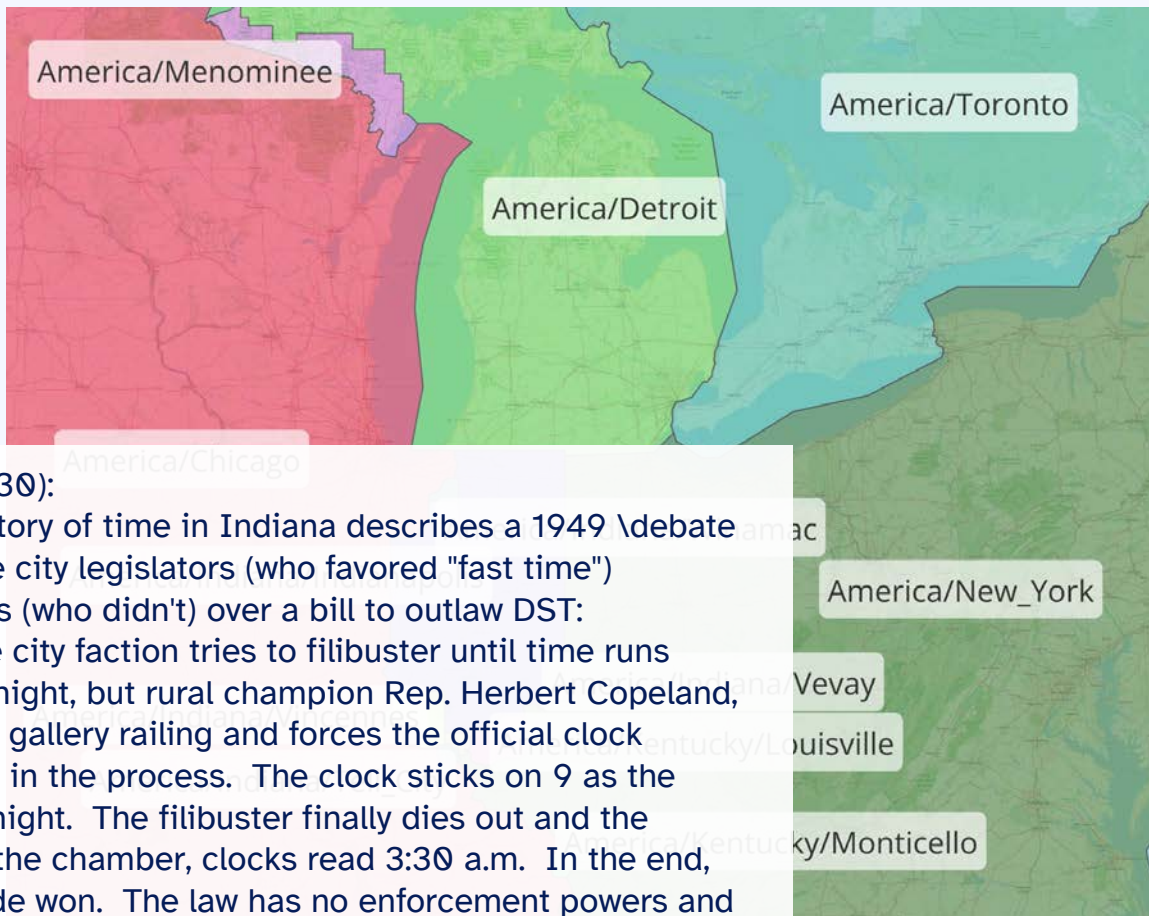
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DST Fun



Lost FUN + 2006

- Most of Indiana observing ET (but no ET DST)
- Some Counties with ET DST
- Counties with CT (& DST)



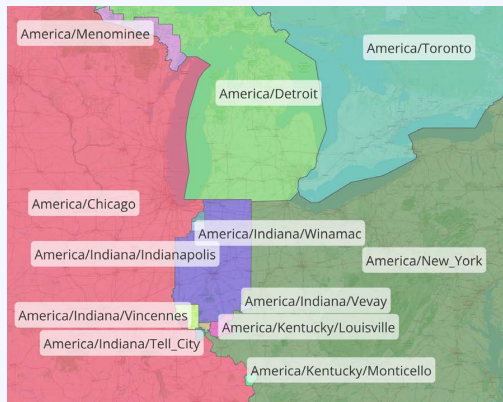
From Paul Eggert (2018-11-30):

A brief but entertaining history of time in Indiana describes a 1949 debate
in the Indiana House where city legislators (who favored "fast time")
tussled with farm legislators (who didn't) over a bill to outlaw DST:
"Lacking enough votes, the city faction tries to filibuster until time runs
out on the session at midnight, but rural champion Rep. Herbert Copeland,
R-Madison, leans over the gallery railing and forces the official clock
back to 9 p.m., breaking it in the process. The clock sticks on 9 as the
debate rages on into the night. The filibuster finally dies out and the
bill passes, while outside the chamber, clocks read 3:30 a.m. In the end,
it doesn't matter which side won. The law has no enforcement powers and
is simply ignored by fast-time communities."



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Lost FUN + 2006



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it doesn't matter which side won. The law has no enforcement powers and
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Daylight Saving Time (DST) – not all are the same

Welcome to Lord Howe Island - DST +00:30



21:47:42 LHD
Thursday, 27 February 2025
[Fullscreen](#)

Current: LHD — Lord Howe Daylight Time

Next Change: LHST — Lord Howe Standard Time

Current Offset: UTC/GMT +11 hours

Difference: 10 hours ahead of Hamburg



2025 Time Zones - Lord Howe Island

LHD UTC+11h			LHST UTC+10:30h						LHD UTC+11h		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec



Troll Station, Antarctica - DST +02:00



12:01:18 GMT
Monday, 10 March 2025
[Fullscreen](#)

Current: GMT — Greenwich Mean Time

Next Change: CEST — Central European Summer Time

Current Offset: No UTC/GMT offset

Difference: 1 hour behind Hamburg

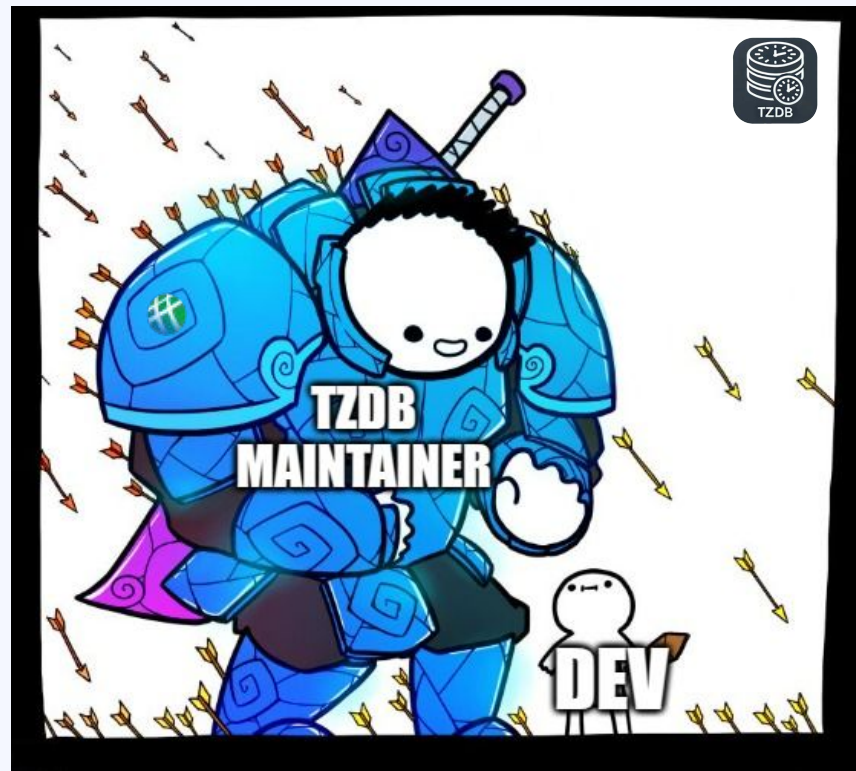


2025 Time Zones - Troll Station

GMT UTC			CEST UTC+2h						GMT UTC		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

time zone database (tzdb)

Somebody has to keep track of it all



tz database - keeping Computers in Sync



IANA Time Zone Database (TZDB): A global database that defines time zones, UTC offsets, and daylight saving rules (and leap seconds) for accurate timekeeping in software and systems

- Internet Assigned Numbers Authority (**IANA**) overseen by the Internet Corporation for Assigned Names and Numbers (**ICANN**)
- Founded by Arthur David Olson; Paul Eggert is the editor and coordinator (aka “[the Time Zone King](#)”)
- Proposed changes are sent to the [tz mailing list](#)
- [RFC6557](#): Procedures for Maintaining the Time Zone Database





tz mailing list

[tz] Antarctic research base Vostok local time

АПС АКУЛОВ [leader_vostok at aari.ru](#)

Sun Dec 17 15:00:48 UTC 2023

- Previous message: [\[tz\].\[BUG\] Expression is always zero](#)
- Next message: [\[tz\] Antarctic research base Vostok local time](#)
- Messages sorted by: [\[date\]](#) [\[thread\]](#) [\[subject\]](#) [\[author\]](#)

Pse be informed that from **December, 18, 2023 00:00** by my decision the local time of the Antarctic research base Vostok will correspond to UTC+5.

Sincerely,

Chief of Antarctic research base Vostok,

Zakhary V. Akulov

--

УВАЖЕНИЕМ=

АПС АКУЛОВ=

69 РАЭ СТ ВОСТОК-

----- next part -----

An HTML attachment was scrubbed...

URL: <<https://mm.icann.org/pipermail/tz/attachments/20231217/2275eb33/attachment.html>>

Spoiler:

# Zone NAME	STDOFF	RULES	FORMAT	[UNTIL]
Zone Antarctica/Vostok	0	-	-00	1957 Dec 16
	7:00	-	%Z	1994 Feb
	0	-	-00	1994 Nov
	7:00	-	%Z	2023 Dec 18 2:00
	5:00	-	%Z	





tzdb - content (~500 KiB)

- **Time Zone Data Files**
- Leap Second Data (`Leap 2016 Dec 31 23:59:60`)
- Tools Source Code
 - Zone Information Compiler (`zic`): text -> `.tz` binary files
 - `zdump`: timezone dumper
- Scripts
 - awk scripts to validate time zone files
 - awk scripts to shrink zones
- Documentation & Metadata
 - NEWS: Changelog
 - `theory.html`: design principles and historical accuracy

tzdb - content overview



africa	CONTRIBUTING	leap-seconds.list	northamerica	tzdata.zi	zdump.8
antarctica	date.1	LICENSE	private.h	tzfile.5	zdump.8.txt
asctime.c	date.1.txt	localtime.c	README	tzfile.5.txt	zdump.c
asia	date.c	Makefile	SECURITY	tzfile.h	zic.8
australasia	difftime.c	newctime.3	southamerica	tz-how-to.html	zic.8.txt
backward	etcetera	newctime.3.txt	strftime.c	tz-link.html	zic.c
backzone	europe	NEWS	theory.html	tzselect.8	ziguard.awk
calendars	factory	newstrftime.3	time2posix.3	tzselect.8.txt	zishrink.awk
checklinks.awk	iso3166.tab	newstrftime.3.txt	time2posix.3.txt	tzselect.ksh	zone1970.tab
checknow.awk	leapseconds	newtzset.3	to2050.tzs	version	zonenow.tab
checktab.awk	leapseconds.awk	newtzset.3.txt	tz-art.html	workman.sh	zone.tab

theory.html - naming



The naming conventions attempt to strike a balance among the following goals:

- Uniquely identify every timezone where clocks have agreed since 1970. This is essential for the intended use: static clocks keeping local civil time.
- Indicate to experts where the timezone's clocks typically are.
- Be robust in the presence of political changes. **For example, names are typically not tied to countries, to avoid incompatibilities when countries change their name (e.g., Swaziland→Eswatini) or when locations change countries (e.g., Hong Kong from UK colony to China).** There is no requirement that every country or national capital must have a timezone name.
- Be portable to a wide variety of implementations.
- Use a consistent naming conventions over the entire world.

tzdb - zone1970.tab



- lists primary time zones per country, focusing on post-1970 uniform time rules
- each line represents a time zone:
 1. Comma-separated list of countries that overlap the timezone
 2. Latitude and longitude of the timezone's principal location
 3. Timezone name used in value of TZ environment variable
 4. Comments



#codes	coordinates	TZ	comments
DE, DK, NO, SE, SJ	+5230+01322	Europe/Berlin	most of Germany
CH, DE, LI	+4723+00832	Europe/Zurich	Büdingen

backward:	Link	Europe/Zurich	Europe/Busingen
------------------	------	---------------	-----------------

tzdb - time zone file - europe



```
# Germany (Busingen enclave)
# Liechtenstein
# Switzerland
```

```
# From Tobias Conradi (2011-09-12):
# Büsingen <http://www.buesingen.de>, surrounded by the Swiss canton
# Schaffhausen, did not start observing DST in 1980 as the rest of DE
# (West Germany at that time) and DD (East Germany at that time) did.
# DD merged into DE, the area is currently covered by code DE in ISO 3166-1,
# which in turn is covered by the zone Europe/Berlin.
#
# Source for the time in Büsingen 1980:
# http://www.srf.ch/player/video?id=c012c029-03b7-4c2b-9164-aa5902cd58d3
#
# From Arthur David Olson (2012-03-03):
# Büsingen and Zurich have shared clocks since 1970.
```





tzdb - time zone file - europe

# Rule	NAME	FROM	TO	-	IN	ON	AT	SAVE	LETTER/S
Rule	Swiss	1941	1942	-	May	Mon>=1	1:00	1:00	S
Rule	Swiss	1941	1942	-	Oct	Mon>=1	2:00	0	-
Rule	EU	1977	1980	-	Apr	Sun>=1	1:00u	1:00	S
Rule	EU	1977	only	-	Sep	lastSun	1:00u	0	-
Rule	EU	1978	only	-	Oct	1	1:00u	0	-
Rule	EU	1979	1995	-	Sep	lastSun	1:00u	0	-
Rule	EU	1981	max	-	Mar	lastSun	1:00u	1:00	S
Rule	EU	1996	max	-	Oct	lastSun	1:00u	0	-



Germany (Busingen enclave)

Liechtenstein

Switzerland

# Zone	NAME	STDOFF	RULES	FORMAT	[UNTIL]
Zone	Europe/Zurich	0:34:08	-	LMT	1853 Jul 16 # See above comment.
	#STDOFF	0:29:45.500			
		0:29:46	-	BMT	1894 Jun # Bern Mean Time
		1:00	Swiss	CE%sT	1981
		1:00	EU	CE%sT	



DST can happen more than twice a year



```
# From Paul Eggert (2023-03-14):
# For now, guess that in the future Morocco will fall back at 03:00
# the last Sunday before Ramadan, and spring forward at 02:00 the
# first Sunday after one day after Ramadan. To implement this,
# transition dates and times for 2019 through 2087 were determined by
# running the following program under GNU Emacs 28.2. (This algorithm
# also produces the correct transition dates for 2016 through 2018,
# though the times differ due to Morocco's time zone change in 2018.)
```

```
# (let ((islamic-year 1440))
#   (require 'cal-islam)
#   (while (< islamic-year 1511)
#     (let ((a (calendar-islamic-to-absolute (list 9 1 islamic-year)))
#           (b (+ 1 (calendar-islamic-to-absolute
#                     (list 10 1 islamic-year)))))
#       (sunday 0))
#     (while (/= sunday (mod (setq a (1- a)) 7)))
#     (while (/= sunday (mod b 7))
#       (setq b (1+ b)))
#     (setq a (calendar-gregorian-from-absolute a))
#     (setq b (calendar-gregorian-from-absolute b))
#     (insert
#      (format
#       (concat "Rule\tMorocco\t%d\tonly\t-\t%s\t%d\t 3:00\t-1:00\t-\n"
#               "Rule\tMorocco\t%d\tonly\t-\t%s\t%d\t 2:00\t0\t-\n")
#       (car (cdr (cdr a))) (calendar-month-name (car a) t) (car (cdr a))
#       (car (cdr (cdr b))) (calendar-month-name (car b) t) (car (cdr b))))
#     (setq islamic-year (+ 1 islamic-year))))
```

# Rule	NAME	FROM	TO	-	IN	ON	AT	SAVE
Rule	Morocco	2013	2018	-	Oct	lastSun	3:00	0
Rule	Morocco	2014	2018	-	Mar	lastSun	2:00	1:00
Rule	Morocco	2018	only	-	May	13	3:00	0
Rule	Morocco	2018	only	-	Jun	17	2:00	1:00
Rule	Morocco	2019	only	-	May	5	3:00	-1:00
Rule	Morocco	2019	only	-	Jun	9	2:00	0
...								
Rule	Morocco	2028	only	-	Mar	5	2:00	0
Rule	Morocco	2029	only	-	Jan	14	3:00	-1:00
Rule	Morocco	2029	only	-	Feb	18	2:00	0
Rule	Morocco	2029	only	-	Dec	30	3:00	-1:00
Rule	Morocco	2030	only	-	Feb	10	2:00	0
Rule	Morocco	2030	only	-	Dec	22	3:00	-1:00



DST is no longer in fashion



Release 2025a NEWS:

“Paraguay will stop changing its clocks after the spring-forward transition on **2024-10-06**, so it is now permanently at **-03**.

(Thanks to Heitor David Pinto and Even Scharning.)

This affects timestamps starting **2025-03-22**, as well as the obsolescent tm_isdst flags starting **2024-10-15**.”

# Rule	NAME	FROM	TO	-	IN	ON	AT	SAVE
Rule	Para	2010	2024	-	Oct	Sun>=1	0:00	1:00
Rule	Para	2013	2024	-	Mar	Sun>=22	0:00	0
# Zone	NAME	STDOFF	RULES	FORMAT	[UNTIL]			
Zone	America/Asuncion	-3:50:40	-	LMT	1890			
		-3:50:40	-	AMT	1931 Oct 10	# Asunción Mean Time		
		-4:00	-	%Z	1972 Oct			
		-3:00	-	%Z	1974 Apr			
		-4:00	Para	%Z	2024 Oct 15			
		-3:00	-	%Z				

🇹🇷 2015 Turkey Daylight Saving Time adjustment 🇹🇷



Change the end of DST date from **October 25th** to **November 8th**

- September 8th: unofficial news article
- September 29th: government news agency
- **October 1st: tzdb update**
- October 4th: official announcement from the government
- October 21st: Apple released iOS Update
- **October 25th: still DST**
- October 26th: pytz releases 2015.7 update 🐌😓

In 2016 Haiti gave one day notice that DST is canceled 🇭🇹



Europe/Dublin



As per legislation, **Irish Standard Time** is UTC+01.

Winter time (GMT) is encoded in the DB as negative 1 hour of daylight saving. (tm_isdst is reversed)

Even more tzdb formats

- rearguard (backwards compatible)
- vanguard (negative DST offsets)



Africa/Casablanca



Africa/Windhoek



Europe/Dublin



Windows fun



- Windows does not use the **tzdb**
- Windows stores time zone data in its registry
- Hotfixes have to be applied manually
- Windows has separate time zone names

W. Europe Standard Time	Europe/Berlin
Central Europe Standard Time	Europe/Paris
Russia Time Zone 2	Europe/Moscow
UTC+12	Etc/GMT-12





C# / dotnet extra fun

```
public static TimeZoneInfo FindSystemTimeZoneById(string id);
```

“On Windows systems, `FindSystemTimeZoneById` tries to match `id` to the subkey names of the `HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\Time Zones` branch of the registry. On Linux and macOS, it uses time zone information available in the ICU Library.”

- ✗ `TimeZoneInfo.FindSystemTimeZoneById("Europe/Berlin")`
fails on Windows
- ✗ `TimeZoneInfo.FindSystemTimeZoneById("W. Europe Standard Time")`
fails on Linux / Mac

→ Use [TimeZoneConverter](#) Package
Or [Noda Time](#)

TimeZoneConverter Downloads

Total	193.5M
Current version	414.3K
Per day average	65.5K

NodaTime Downloads

Total	182.2M
Current version	1.1M
Per day average	36.8K



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Don't use JavaScript Date Object / API



- JavaScript Date API is quite bad
- Based on Java 1.0
- Date is stored as millisecond count since the epoch
- No arithmetic support ([List of 2024 Leap Day Bugs](#))
- Mutable

- Parsing is inconsistent

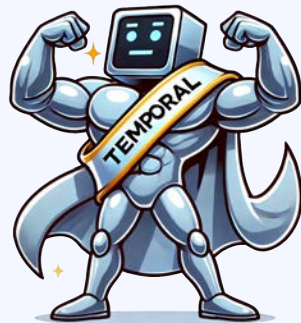
- `new Date("2025-01-01").toLocaleString("de-DE")`
`> '1.1.2025, 01:00:00'`
- `new Date("2025-01-01T13:00:00").toLocaleString("de-DE")`
`> '1.1.2025, 13:00:00'`

Parsed as UTC

Parsed as LocalTime
(since ES5)

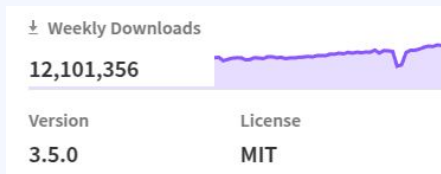
JavaScript Temporal

- Stage 3 tc39 proposal
- Immutable objects
- Robust time zone support
- Built-in arithmetic (higher order vs lower order)
- Consistent ISO-8601 parsing guarantees
- Support for interacting with legacy Date



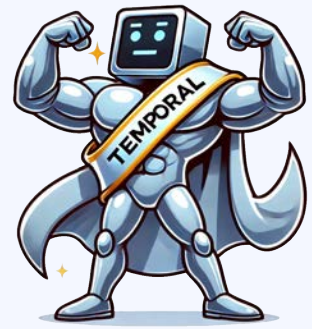
Still no custom date format parsing :(

Take a look at [luxon](#) (momentjs successor)



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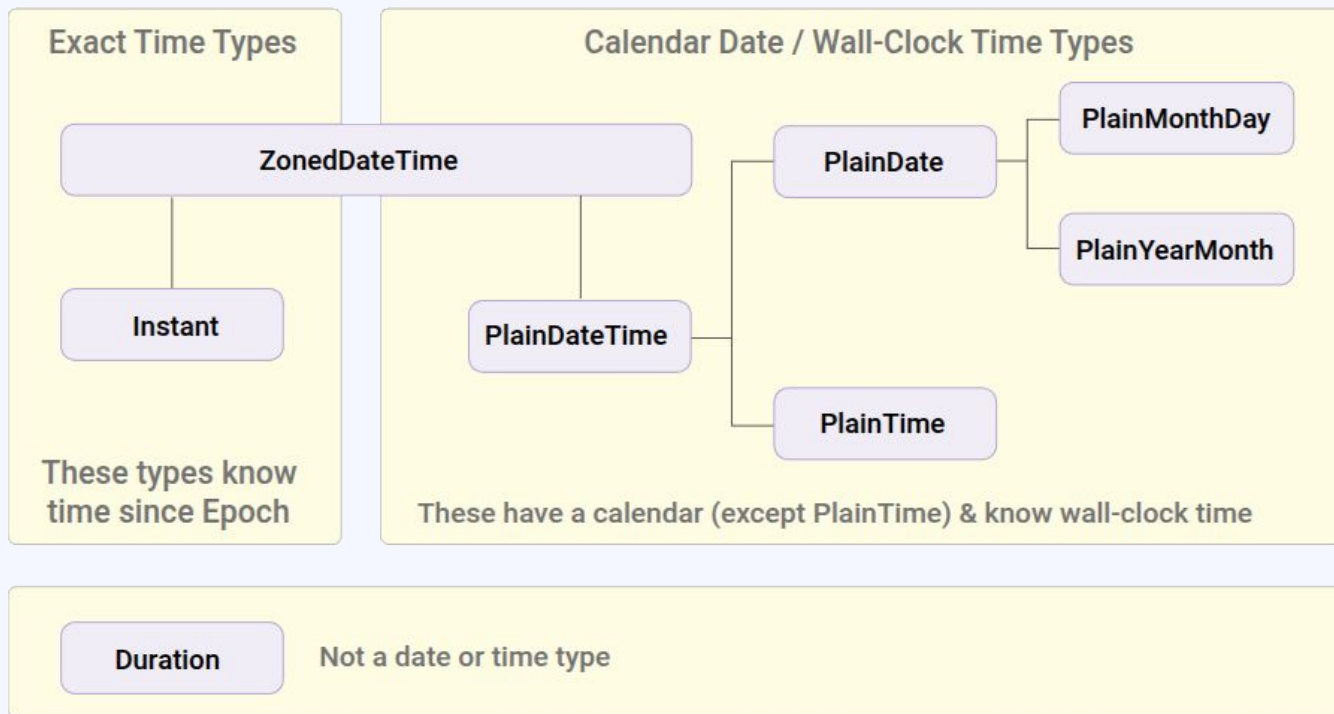
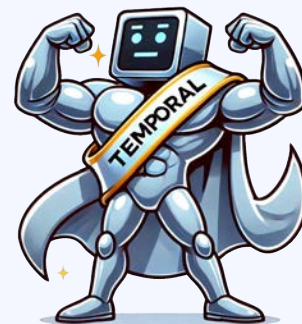
JavaScript Temporal



Separation of Concerns

- `Temporal.Instant`: exact moment in UTC
- `Temporal.PlainDate`: 2025-03-13
- `Temporal.PlainTime`: 19:30:00
- `Temporal.PlainYearMonth`: 2025-03
- `Temporal.PlainMonthDay`: 03-13
- `Temporal.PlainDateTime`: local date time without time zone info
- `Temporal.ZonedDateTime`: represents a date and time in a specific time zone
- `Temporal.Duration`: '-P2DT12H', used for arithmetic

JavaScript Temporal - Object relationship



Work with time zones



- Always set **TZ=UTC** on all your servers
- If local time does not matter store **timestamps as UTC**
 - Postgres use `timestamp [ (p) ] with time zone`
`time [ (p) ] with time zone`
(does not store offset 😞)
 - Sql Server use `DATETIMEOFFSET`
(stores offset 😮)
- If local time matters (future or near past events):
 - Local time
 - “current” derived UTC instant
 - Time zone name
 - Time zone rules version
 - (Offset)



How to handle DST Changes - forwards

Google Calendar

Add title

Event Focus time Out of office Working location Task Appointment schedule

Sunday, 30 March 3:00am - 3:00am

☐ All day Time zone

Does not repeat

Add guests

Add Google Meet video

Add rooms or location

Add description or a Google Drive attachment

Bernd Kaiser

Busy • Default visibility • Notify 10 minutes before

More options Save

Teams

New meeting Details Scheduling Assistant

Show as: Busy Category: None Time zone: (UTC+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna Response options

Add title

Add required attendees

3/30/2025 3:00 AM → 3/30/2025 3:30 AM 30m All day

Does not repeat

Add channel

Add location

Online meeting

Type details for this new meeting

Add an agenda

Nonexistent Time



When happens **2025-03-30 02:30:00** in **Europe/Berlin**?

```
import { Temporal } from "temporal-polyfill";

const timeZone = "Europe/Berlin";
const tz = Temporal.TimeZone.from(timeZone);

const dateString = "2025-03-30T02:30:00";
const dateTime = Temporal.PlainDateTime.from(dateString);

const possibleInstants: Temporal.Instant[] = tz.getPossibleInstantsFor(dateTime);

console.log(possibleInstants);
```

```
> []
```




How to handle DST Changes - backwards

Google Calendar

Google Calendar interface showing a meeting setup for Sunday, 26 October. The time zone is set to 2:30am - 3:30am. A dropdown menu is open, showing time options: 2:00am, 2:15am, 2:30am, 2:45am, and 3:00am. The meeting is created by Bernd Kaiser, with a default visibility and a 10-minute notification.

Teams

Microsoft Teams interface showing a new meeting setup for 10/26/2025. The time zone is set to 2:00 AM - 2:30 AM. A dropdown menu is open, showing time options: 1:30 AM, 2:00 AM, 2:30 AM, and 3:00 AM. The meeting is created by Bernd Kaiser, with a default visibility and a 10-minute notification.



Ambiguous Time



When happens **2025-10-26 02:30:00** in **Europe/Berlin**?

```
import { Temporal } from "temporal-polyfill";

const timeZone = "Europe/Berlin";
const tz = Temporal.TimeZone.from(timeZone);

const dateString = "2025-10-26T02:30:00";
const dateTime = Temporal.PlainDateTime.from(dateString);

const possibleInstants: Temporal.Instant[] = tz.getPossibleInstantsFor(dateTime);

console.log(possibleInstants);

> ["2025-10-26T00:30:00Z", "2025-10-26T01:30:00Z"]
```

Browser History Hour: moment-tz before; Intl now; Temporal in the future;



- moment-timezone shipped their own time zone definitions
- Intl.DateTimeFormat().resolvedOptions() exposed time zone definitions & settings from the Browser / System (MDM: Baseline Widely available)
- Temporal is still a proposal (Stage 3 Draft / March 1, 2025)

Install

```
> npm i moment-timezone
```

Repository

github.com/moment/moment-timezone

Homepage

momentjs.com/timezone/

Weekly Downloads

10,131,662



moment-timezone - packed format

Zone Name Observed Times Offsets (base60)

"Europe/Berlin|LMT CET CEST CEMT|-R.s -10 -20 -30|

Offset Index 012121212121212321212321212121212121212121...|

DST
Transitions
as diff:

-36RcR.s UbWR.s 11d0 1iO0 11A0 1o00 11A0 Qrc0 6i00 WM0 1fA0 1cM0 1cM0
1cM0 kL0 Nc0 m10 WM0 1ao0 1cp0 dX0 jz0 Dd0 1io0 17c0 1fA0 1a00 1ehA0
1a00 1cM0 1cM0 1cM0 1cM0 1cM0 1cM0 1cM0 1fA0 1cM0 1cM0 1cM0 1cM0
1cM0...|

Population: 41e5",

unpacked	11.3 MiB
unpacked gzip	1.2 MiB
packed	709 Kib
packed gzip	35 KiB

timezone - guessing game



Since ES5.1 (~2013): users time zone can be queried with:

`Intl.DateTimeFormat().resolvedOptions().timeZone`

```
{  
  calendar: "gregory"  
  day: "numeric"  
  locale: "en-US"  
  month: "numeric"  
  numberingSystem: "latn"  
  timeZone: "Europe/Berlin"  
  year: "numeric"  
}
```

Before (with moment-timzone):

1. With `userOffsets()` check all months of the last two years if the offset changed (and find exact moment)
2. Find matching time zones by comparing offset changes
3. If more time zones are found they are scored
 - a. Best offset match
 - b. Best abbreviation match ('18:20:06 GMT+0100 (**Central European Standard Time**)')
 - c. Largest Population

Homework - <https://i18n-puzzles.com/>

Internationalization Puzzles - A trip around the world



Departure: Europe/London	Mar 04, 2020, 10:00
Arrival: Europe/Paris	Mar 04, 2020, 11:59
Departure: Europe/Paris	Mar 05, 2020, 10:42
Arrival: Australia/Adelaide	Mar 06, 2020, 16:09

Internationalization Puzzles - The audit trail fixer

2012-11-05T09:39:00.000-04:00	969	3358
2012-05-27T17:38:00.000-04:00	2771	246
2001-01-15T22:27:00.000-03:00	2186	2222
2017-05-15T07:23:00.000-04:00	2206	4169
2005-09-02T06:15:00.000-04:00	1764	794
2008-03-23T05:02:00.000-03:00	1139	491
2016-03-11T00:31:00.000-04:00	4175	763
2015-08-14T12:40:00.000-03:00	3697	568
2013-11-03T07:56:00.000-04:00	402	3366
2010-04-16T09:32:00.000-04:00	3344	2605

“Fixing the audit trails is not simple. One major challenge is that all timestamps are kept as local times with a GMT offset. Unfortunately, GMT offsets are not time zones. The difference between time zones and GMT offsets is subtle but important: with just a GMT offset, you can't know if you have to apply daylight savings time changes, or not”.

Thanks a lot!



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