

关于时间

QConBeijing 2018

<http://johnhax.net/2018/temporal/slide.html#0>

个人简介

<http://johnhax.net/2018/temporal/slide.html#1>

hax

<http://johnhax.net/2018/temporal/slide.html#2>

贺师俊

<http://johnhax.net/2018/temporal/slide.html#3>

百姓网

www.baixing.com

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架构部

前 端

HTML

<http://johnhax.net/2018/temporal/slide.html#7>

JavaScript

<http://johnhax.net/2018/temporal/slide.html#8>

proposal-function-this

时间

Time

平常

复 杂

历法

<http://johnhax.net/2018/temporal/slide.html#13>

天文

年 月 日

- 年 太阳
- 月 月亮
- 日 地球

政治、宗教、文化

公 厩

- 农历
- 佛历
- 印度历
- 希伯来历
- 波斯历
- 伊斯兰历

- 年 月 日
- 月 日 年
- 日 月 年

现代编程语言 内置的时间API

<http://johnhax.net/2018/temporal/slide.html#21>

ISO 8601

格里历

<http://johnhax.net/2018/temporal/slide.html#23>

外推格里历

Proleptic Gregorian calendar

<http://johnhax.net/2018/temporal/slide.html#24>

~~政治、宗教、文化~~

天文

+1S

闰秒

Leap Second

<http://johnhax.net/2018/temporal/slide.html#28>

Bugs

<http://johnhax.net/2018/temporal/slide.html#29>

~~政治、宗教、文化~~

天 文

时间 API

<http://johnhax.net/2018/temporal/slide.html#32>

Date

<http://johnhax.net/2018/temporal/slide.html#33>

```
new Date()
Date.now()
Date.UTC(Y, M=0, D=1, h=0, m=0, s=0, ms=0)
Date.parse(s)
date.toString()
date.toDateString()
date.toTimeString()
date.toGMTString()
date.toUTCString()
date.toISOString()
date.toLocaleString()
date.toLocaleDateString()
date.toLocaleTimeString()
date.toJSON()
date.valueOf()
date.getYear(), date.setYear(Y)
date.getFullYear(), date.setFullYear(Y)
date.getMonth(), date.setMonth(M)
date.getDate(), date.setDate(D)
date.getTime(), date.setTime(t)
date.getHours(), date.setHours(h)
date.getMinutes(), date.setMinutes(m)
date.getSeconds(), date.setSeconds(s)
date.getMilliseconds(), date.setMilliseconds(ms)
date.getTimezoneOffset()
```

<http://johnhax.net/2018/temporal/slide.html#34>

问题

<http://johnhax.net/2018/temporal/slide.html#35>

- 好多toXXXString()
- 不支持自定义格式
- 只有 UTC 和 local, 不支持时区
- 缺乏方便的时间计算 API
- 一些 deprecated API
- 精度到毫秒

```
new Date(2018, 4, 16)
```

```
new Date(2018, 4, 16)  
// 2018-05-15T16:00:00.000Z
```

```
new Date(0)
```

```
new Date(0, 0)
```

```
new Date(0, 0, 0)
```



```
new Date(0) // 1970-01-01T00:00:00Z
```

```
new Date(0, 0) // 1899-12-31T16:00:00Z
```

```
new Date(0, 0, 0) // 1899-12-30T16:00:00Z
```

- Too many overloads of `Date()`
- Month is 0-based
- Error tolerant
- UTC vs local

```
Date.parse( '2018-04-16T15:00:00' )
```

```
Date.parse( '2018-04-16T15:00:00Z' )
```

Mutable

<http://johnhax.net/2018/temporal/slide.html#44>

```
const d = new Date(Date.parse('1979-09-01'))  
d.setFullYear(2018)  
console.log(d)
```

```
function getBirthdayOfThisYear(birthday) {  
  birthday.setFullYear(new Date().getFullYear())  
  return birthday  
}  
const user = { name: hax, birthday: new Date(Date.parse('1979-09-01')) }  
const thisBirthday = getBirthdayOfThisYear(user.birthday)
```

```
function getBirthdayOfThisYear(birthday) {  
  const d = new Date(birthday.getTime())  
  d.setFullYear(new Date().getFullYear())  
  return d  
}
```


`input.valueAsDate`

```
const user = {  
  _birthdayTime: Date.parse('1979-09-01'),  
  get birthday() { return new Date(this._birthdayTime) },  
}
```

为什么

那么挫？

Brendan Eich

10天创造

JavaScript

<http://johnhax.net/2018/temporal/slide.html#52>

Java

<http://johnhax.net/2018/temporal/slide.html#53>

java.util.Date

<http://johnhax.net/2018/temporal/slide.html#54>

Java 1.0

<http://johnhax.net/2018/temporal/slide.html#55>

Java 1.1

Java 8

<http://johnhax.net/2018/temporal/slide.html#57>

java.time

<http://johnhax.net/2018/temporal/slide.html#58>

- 不变性
- 分离人类可读时间和机器时间
- 更清晰的 API 接口
- 实用运算
- 可扩展性

庫

<http://johnhax.net/2018/temporal/slide.html#60>

- Moment.js
- date-fns
- js-joda

```
moment().format('MMMM Do YYYY, h:mm:ss a')  
moment().format('dddd')  
moment().format("MMM Do YY")  
moment().format('YYYY [escaped] YYYY')  
moment("20180422", "YYYYMMDD")
```

```
moment().startOf('day')  
moment().endOf('day')  
moment().startOf('hour')  
moment().subtract(10, 'days')  
moment().add(1, 'hours')
```


- Why Moment.js Isn't Immutable Yet
- moment.js为何要设计成mutable的，有何优缺点？

```
LocalDate.now()
const d = LocalDate.of(2018, 4, 22)
d.plusDays(365)
d.minusDays(365)
d.withDayOfMonth(1)
d.withMonth(1).withDayOfMonth(1)
d.isAfter(d.minusDays(1))
LocalTime.now()
d.atTime(LocalTime.of(17, 55))
const dt = LocalDateTime.parse('2018-02-26T23:55:42.123')
dt.truncatedTo(ChronoUnit.HALF_DAYS); // '2018-02-26T12:00'
```

提案

<http://johnhax.net/2018/temporal/slide.html#66>

proposal-temporal

<http://johnhax.net/2018/temporal/slide.html#67>

Champions

- Maggie Pint (@maggiepint)
- Matt Johnson (@mj1856)
- Brian Terlson (@bterlson)

Civil Time

<http://johnhax.net/2018/temporal/slide.html#69>

- `CivilDate 2017-12-31`
- `CivilTime 17:00:00`
- `CivilDateTime 2017-12-31T12:00:00`

Absolute Time

<http://johnhax.net/2018/temporal/slide.html#71>

- Instant 2017-12-31T00:00:00Z
- ZonedInstant
2017-12-31T09:00:00+08:00[Asia/Beijing]

```
const civilDate = new CivilDate(2018, 4, 22)
const year = civilDate.year
const month = civilDate.month
const day = civilDate.day
```

```
const {year, month, day} = civilDate
```

```
const d2 = d1.plus({months: 1})  
const t = new CivilTime(17, 30, 15, 0, 0)  
const dt1 = d1.withTime(t)  
const dt2 = t.withDate(d1)
```

```
m.add(1, 'month').add(1, 'day')  
j.plusMonths(1).plusDays(1)  
d.plus({month: 1, day: 1})
```

```
let civilDateTime = CivilDateTime.from(date, time)
let civilDateTime2 = civilDateTime1.plus({days: 3, hours: 4, minutes: 2, seconds: 12})
let civilDate = civilDateTime.toCivilDate()
let civilTime = civilDateTime.toCivilTime()
let newCivilDate = civilDate.with({year: 2017, month: 3})
let zonedInstant = civilDateTime.withZone(timeZone[, options])
```

<http://johnhax.net/2018/temporal/slide.html#77>

```
new Instant(milliseconds[, nanoseconds])
const {milliseconds, nanoseconds} = instant
const zonedDateTime = instant.withZone(timeZone)
const civilDateTime = zonedDateTime.toCivilDateTime()
const civilDate = zonedDateTime.toCivilDate()
const civilTime = zonedDateTime.toCivilTime()
const instant = zonedDateTime.toInstant()
```

一些讨论

<http://johnhax.net/2018/temporal/slide.html#79>

CivilXXX 命名 Local 的意思

- Date/Time/DateTime
- Civil
- Local
- Plain
- Unzoned
- CalendarDate/ClockTime/DateTime

其他历法？

其他时间构造?

<http://johnhax.net/2018/temporal/slide.html#83>

- Period
- Year
- YearMonth
- MonthDay
- OffsetTime
- ZonedDateTime

总结

<http://johnhax.net/2018/temporal/slide.html#85>

Q & A

- [@johnhax](#)
- zhihu.com/people/he-shi-jun