REVIVING LE MINITEL
SUMMARY

• How France conquered the world
• How it worked
• HTML5 and ES6 to the rescue
• Creating a VideoTex page [live demo]
• Surfing on Minitel [live demo]
How France conquered the World
France was REALLY late (late 1960s)

- **Household equipment**
  - USA = 90.5%
  - France = 15.2%

- **Installation time**
  - USA = 3 days
  - France = 3 years

- **QoS**
  - less than 60% of calls succeeded
So what?

- Manual switching until **the late 1970s**!
  - First automatic switch was tested in 1912
  - France is completely automated in 1978

- Up to 30000 operators
  - ~100 subscribers / operator
  - < 400 calls / hour / operator

- But France has a super plan!
Catch up and take the lead!

- Late 1960s, a decision is made
- **1972, DGT becomes the first investor in France**
  Direction Générale des Télécommunications / General Direction of Telecommunications
- **1978, PSTN is complete**
  Réseau Téléphonique Commuté RTC / Public Switched Telephone Network
- **1978, Transpac is born**
  French packet switched network based on X.25
Transpac

- A public network: RCP
  packed switched network, virtual circuit, X.25

- Variable rate
  50 bits/s to 64000 bits/s

- Heterogeneous
  direct access, modem, Telex...

- New pricing
  depends on rate and connection time, does not depend on distance
What could you do with Transpac?

- B2B applications
  - Links between agencies (banks, insurance...)
  - ATM machine
  - Payment terminal

- B2C applications
  - Minitel
Here comes the Minitel!

- Minitel = television + network + computing
  - 1974, BBC’s Ceefax
  - 1979, CCETT’s Antiope
- Getting it adopted by the French is not an easy task
  - Micro-computing is hard to grasp
  - Micro-computing is expensive
  - Nobody dreams of network
Make it easy to use

- A simple terminal
  - zero maintenance, zero config
  - easy to install and use

- One killer app
  electronic telephone directory

- Ad campaign

- A **FREE** terminal
  free as in free beer!
1 Minitel = 260 €

750 M€ on the map

In 1993
- 6.5 millions of Minitel
- 500000 internal cards

Paid by the French state

Need to get the money back
How it worked
The Minitel network

HOME

FRANCE TÉLÉCOM

-provider

TRANSPAC

PROVIDER

1200/75

V23

PSTN

PAVI

PACKET SWITCH

X.25

servers

phone

Minitel

3615

3614

télétel

19200

9600

1200/75

The Minitel network
Le Minitel

- A b&w passive terminal
  7 bits, uses Videotex

- 40 columns for 25 rows
  320 × 250 pixels, semi-graphic

- 8 colors
  though displayed as 8 shades of gray

- Rate
  ↓ 1200 bits/s, ↑ 75 bits/s
Semi-graphic
### A complex set of attributes

<table>
<thead>
<tr>
<th>ROM/RAM</th>
<th>alphabetic/mosaic</th>
<th>video invert</th>
<th>width</th>
<th>height</th>
<th>blink</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 ROM</td>
<td>ordinal</td>
<td></td>
<td>A</td>
<td>A</td>
<td>⚡</td>
</tr>
<tr>
<td>128 ROM</td>
<td>ordinal</td>
<td></td>
<td>⚡</td>
<td>⚡</td>
<td>⚡</td>
</tr>
<tr>
<td>96 RAM</td>
<td>1..3</td>
<td>ordinal</td>
<td>A</td>
<td>A</td>
<td>⚡</td>
</tr>
<tr>
<td>96 RAM</td>
<td>1..3</td>
<td>ordinal</td>
<td>⚡</td>
<td>⚡</td>
<td>⚡</td>
</tr>
</tbody>
</table>

- **foreground color**: blue, green, red
- **background color**: blue, green, red
- **Underline**
- **Bold**
- **Video invert**
- **Blink**

**Romania**:

- **ROM/RAM space → 1**: 0, underline
- **foreground color**: blue, green, red
- **background color**: blue, green, red
What Videotex stream looks like

clear screen

go to row 12, column 12

set double width + double height

set foreground color to yellow

set double width + normal height

set foreground color to cyan

move cursor to preceding row

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Minitel 2 hardware

- video RAM (8 kbytes)
- video controller
- screen
- peripheral plug
- keyboard
- modem
- EEPROM (32 kbytes)
- microcontroller
- speaker
- phone line

**Minitel 2 hardware**
<table>
<thead>
<tr>
<th>Web (&lt;HTML5&gt;)</th>
<th>Minitel</th>
</tr>
</thead>
<tbody>
<tr>
<td>client initiates request</td>
<td>full duplex</td>
</tr>
<tr>
<td>no state</td>
<td>continuous</td>
</tr>
<tr>
<td>separation of content and presentation</td>
<td>graphics and text are the same</td>
</tr>
<tr>
<td>hyperlink</td>
<td>no hyperlink</td>
</tr>
<tr>
<td>hardware agnostic</td>
<td>tied to hardware</td>
</tr>
<tr>
<td>HTML, CSS, JS</td>
<td>Videotex</td>
</tr>
</tbody>
</table>
What’s needed to emulate a Minitel

- A widely available platform
- Specific capabilities
  - asynchronous communication
  - graphic primitives
- Identifying essential parts
  - Videotex interpreter
  - video controller
  - a Minitel service to connect to
HTML5 and ES6 to the rescue
HTML5 and ES6

- HTML5 brings essential elements
  - Minitel screen → canvas
  - keyboard click → audio
  - phone line → WebSocket

- ES6 brings lots of programming facilities
  - promises
  - functional approach
  - etc.
The video memory

- Cell
  - Ordinal value
  - Foreground color

- Character
  - Blink
  - DRCS
  - Video invert
  - Width
  - Height
  - Horizontal part
  - Vertical part

- Mosaic
  - Blink
  - DRCS
  - Disjoint
  - Background color

- Delimiter
  - Underline
  - Mask
  - Width
  - Height
  - Background color

Diagram showing the video memory components and their attributes.
Video Display Unit (VDU)

- Refreshes 50 times/second
  - draws modified rows
  - draws blinking characters
- Draws characters given their...
  - fore/back color + video inversion
  - underline
  - size
  - mask
Creating a Minitel page (demo)
Surfing on Minitel (demo)
Resources

- **MiEdit and emulator**
  - sources → https://github.com/Zigazou/miedit
  - online → https://zigazou.github.io/miedit/

- **Minitel font**
  - sources → https://github.com/Zigazou/Minitel-Canvas

- **PyMinitel**
  - sources → https://github.com/Zigazou/PyMinitel
THANKS FOR WATCHING!

- Many thanks to Christian Quest for his invaluable help
- Thanks also go to Julien Mailland
- Contact me
  - Twitter → @zigazou
  - Mail → zigazou@free.fr
# Minitel services... alive!

<table>
<thead>
<tr>
<th>Name</th>
<th>Web</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic telephone directory</td>
<td><a href="http://3611.re/">http://3611.re/</a></td>
<td>+339 7227 3671</td>
</tr>
<tr>
<td>3615 code</td>
<td><a href="http://3615co.de/">http://3615co.de/</a></td>
<td>+339 7252 7252</td>
</tr>
<tr>
<td>3614 Hacker</td>
<td><a href="http://www.3614hacker.fr/">http://www.3614hacker.fr/</a></td>
<td></td>
</tr>
<tr>
<td>3614 Teaser</td>
<td><a href="http://www.3614teaser.fr:8080/">http://www.3614teaser.fr:8080/</a></td>
<td></td>
</tr>
<tr>
<td>3615 SM</td>
<td><a href="http://sm.3615.live/">http://sm.3615.live/</a></td>
<td></td>
</tr>
<tr>
<td>Eureka</td>
<td><a href="http://eureka.rxl1.com/emul/">http://eureka.rxl1.com/emul/</a></td>
<td></td>
</tr>
<tr>
<td>Jelora</td>
<td></td>
<td>+339 7262 9267</td>
</tr>
<tr>
<td>Computel (runs on a vintage Apple //e)</td>
<td></td>
<td>+331 8421 8116</td>
</tr>
<tr>
<td>JCA</td>
<td></td>
<td>+331 8421 8115</td>
</tr>
<tr>
<td>Cosmos 6502</td>
<td></td>
<td>+331 8421 8124</td>
</tr>
</tbody>
</table>