

Making money with Project Fugu

building a cash register
with web technologies

Hi, my name is
Niels Leenheer



The logo for salonhub features two overlapping squares on the left: an orange square on top and a green square on the bottom. To the right of these squares, the word "salonhub" is written in a lowercase, black, sans-serif font.

salonhub



Not a real hairstylist



Not even
connected to
power



Just a random
expired
bank card



Not a real
customer



Inbox

Salonhub at Google I/O Connect - Hi Niels,

Inbox

Salonhub at Google I/O Connect - Hi Niels,

Project Fugu

Window Management

WebHID

WebBluetooth

Project Fugu

WebUSB

WebSerial

Oh, and could we do it in 4 weeks..

Two weeks later..

Employee: Stefan

| | |
|--|---------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Total | € 94,68 |

Card Cash

Discount Points

Product

| | |
|--|---------------|
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Studio Line Invisi Fix 24h Gel 150 ml | € 5,79 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Studio Line Invisi Fix Clean Sculpting Paste 75 ml | € 4,29 |

Price: 5,39

Amount: 1

Employee: Stefan

| | |
|--|---------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
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Price: 5,39

Amount: 1



salonhub

Register

Delete Multiple receipts End of day

Open cashdrawer Previous receipt Pro forma receipt

Employee Stefan

May 24 11:11

Welcome to salonhub

Hardware APIs used in salonhub

ELVIT



Web

Payment solutions

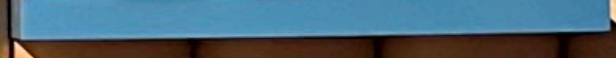
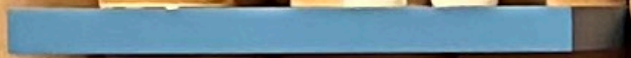
Eats
Angular classic games

JibeCity

Cloud

Connect





Demo

Demo

Building a cash register with web technologies



Receipt printer



```
let device = await navigator.usb.requestDevice({  
  filters: [ { vendorId: 0x04b8 } ]  
});
```

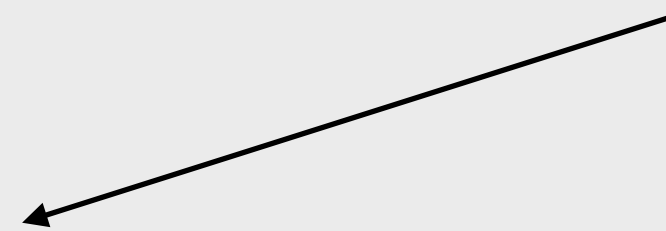
Seiko Epson Corp.



```
let device = await navigator.usb.requestDevice({  
  filters: { vendorId: 0x04b8 }  
});
```

```
await device.open();  
await device.claimInterface(0);  
await device.transferOut(1, payload);
```

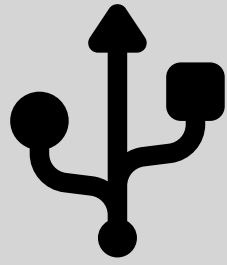
Interface



Endpoint

Endpoint? Inter...what?

USB device enumeration explained, the TL;DR version

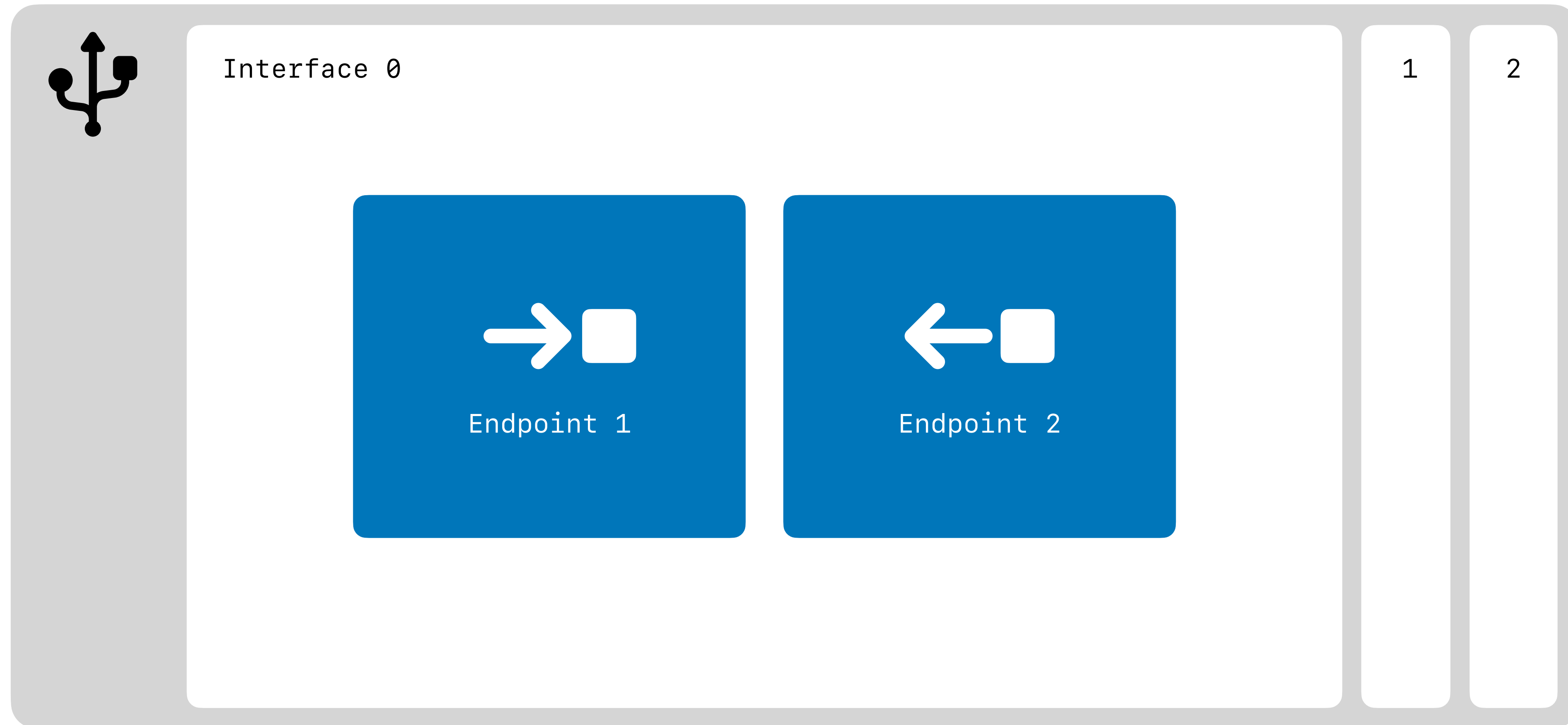


Interface 0

USB device enumeration explained, the TL;DR version



USB device enumeration explained, the TL;DR version





```
let device = await navigator.usb.requestDevice({  
  filters: { vendorId: 0x04b8 }  
});
```

```
await device.open();  
await device.claimInterface(0);  
await device.transferOut(1, payload);
```

Project Fugu allows us to talk to receipt printers,
but we still need to learn their language



```
import * as ReactDOM from 'react-dom';

const root = ReactDOM.createRoot(document.getElementById('root'));
const element = <div>
  <div>Welcome to</div>
  <div className="font-bold">DevFest Hamburg</div>
</div>;

root.render(element);
```

Welcome to `
`

``DevFest Hamburg``

Epson TM-930



YOUR RECEIPT Thank You
Call again

No. 6022
SALE
0030 21210 03001 05111
1234567 CHOCOLATE 2.50
1234569 SUGAR 2.75
897418
Served by PALL 25/08/90
1 V.S.O.P (DINNER)

***** SALE SLIP *****
2 2.40 4.80

(*)+/- /0123456789:;(<=>?@ABCDE
(*)+/- /0123456789:;(<=>?@ABCDE
(*)+/- /0123456789:;(<=>?@ABCDE
BCDEF
DEF

1 SOUP OF BRY 1.10
2 STEAK ON STEAK 6.50
3 MIX SALAD 1.40
4 FRUIT SANDY 1.50
FOOD 10.50
SUBTOTAL 21.15
CASH 21.15
12SEP'900008000255353 1125.R

ascii

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|----|----|----|-----|
| 0. | NUL | SOH | STX | ETX | EOT | ENQ | ACK | BEL | BS | HT | LF | VT | FF | CR | SO | SI |
| 1. | DLE | DC1 | DC2 | DC3 | DC4 | NAK | SYN | ETB | CAN | EM | SUB | ESC | FS | GS | RS | US |
| 2. | | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / |
| 3. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4. | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5. | P | Q | R | S | T | U | V | W | X | Y | Z | [| \ |] | ^ | _ |
| 6. | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 7. | p | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | DEL |

ascii

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|----|----|----|-----|
| 0. | NUL | SOH | STX | ETX | EOT | ENQ | ACK | BEL | BS | HT | LF | VT | FF | CR | SO | SI |
| 1. | DLE | DC1 | DC2 | DC3 | DC4 | NAK | SYN | ETB | CAN | EM | SUB | ESC | FS | GS | RS | US |
| 2. | | ! | " | # | \$ | % | & | ' | () | * | + | , | - | . | / | |
| 3. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4. | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5. | P | Q | R | S | T | U | V | W | X | Y | Z | [| \ |] | ^ | _ |
| 6. | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 7. | p | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | DEL |

Welcome to ^{0A}
LF

DevFest Hamburg ^{0A}
LF

ascii

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|----|----|----|-----|
| 0. | NUL | SOH | STX | ETX | EOT | ENQ | ACK | BEL | BS | HT | LF | VT | FF | CR | SO | SI |
| 1. | DLE | DC1 | DC2 | DC3 | DC4 | NAK | SYN | ETB | CAN | EM | SUB | ESC | FS | GS | RS | US |
| 2. | | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / |
| 3. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4. | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5. | P | Q | R | S | T | U | V | W | X | Y | Z | [| \ |] | ^ | _ |
| 6. | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 7. | p | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | DEL |

Welcome to ^{0A} **LF**

^{1B 45 01} **ESC E 1** DevFest Hamburg ^{1B 45 00} **ESC E 0** ^{0A} **LF**

Text formatting

ESC | E | n Emphasis

ESC | 4 | n Italic

ESC | - | n Underline

GS | ! | n Size

GS | B | n Reverse print

ESC | M | n Font

Images and barcodes

GS | k | m | n | ... Barcode

GS | (| k | pL | pH | cn | fn | ... QR code

ESC | * | m | nL | nH | ... Image

Layout

ESC | a | n Text alignment

Welcome to ^{0A} **LF**

^{1B 45 01}
ESC | E | 1

DevFest Hamburg

^{1B 45 00} ^{0A}
ESC | E | 0 **LF**

^{1D 56 00}
GS | V | 0

1B 40
ESC @ Welcome to LF

1B 45 01
ESC E 1 DevFest Hamburg

1B 45 00 0A
ESC E 0 LF

1D 56 00
GS V 0

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But what about...

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LÅNGFJÄLL

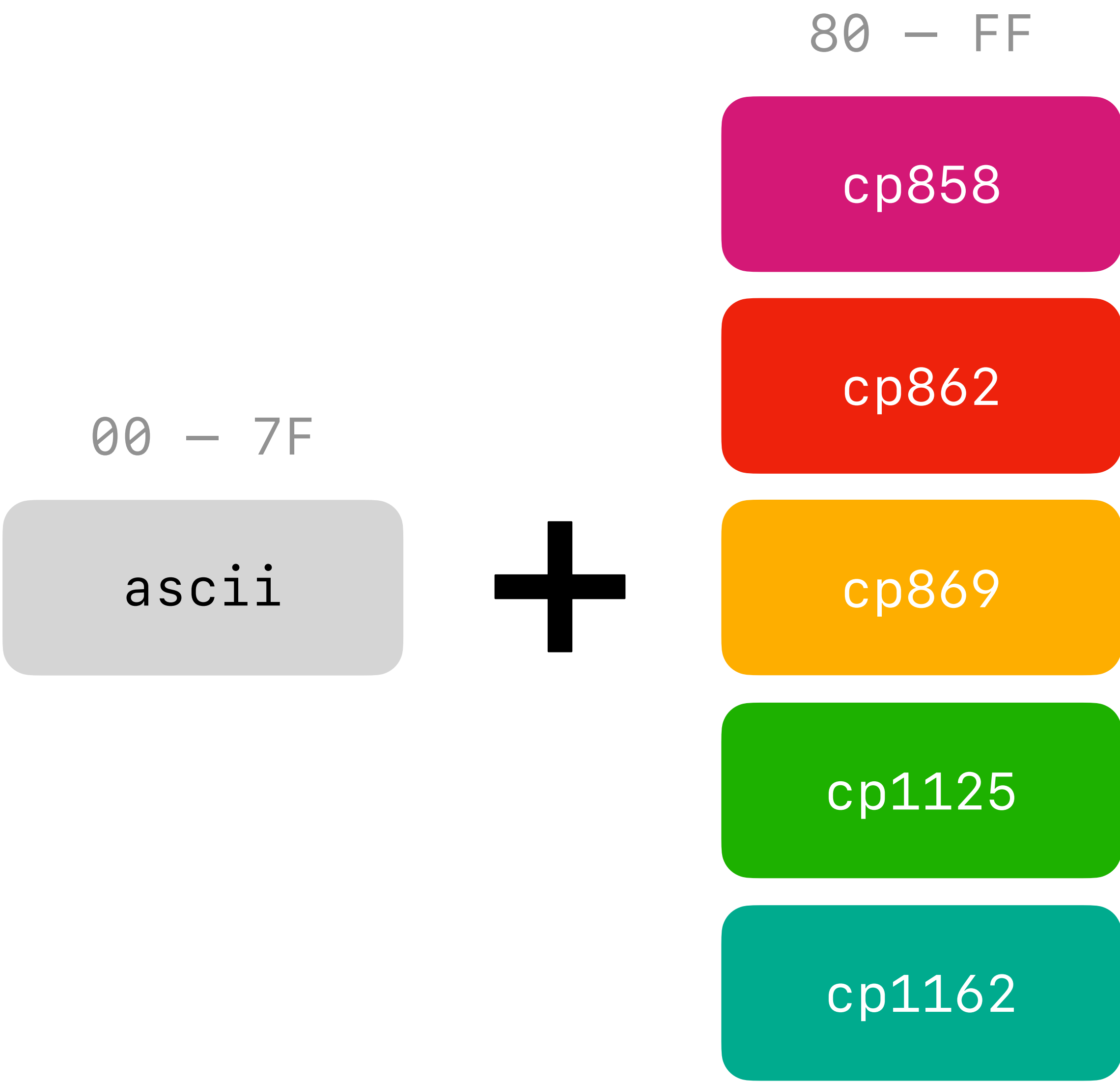


Internationalisation before Unicode

^{1B 40}
ESC @ Welcome to ^{0A}
LF
iñtërnâtiônàlizætìon ^{0A}
LF
before Unicode ^{0A}
LF
^{1D 56 00}
GS V 0

ascii

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|----|----|----|-----|
| 0. | NUL | SOH | STX | ETX | EOT | ENQ | ACK | BEL | BS | HT | LF | VT | FF | CR | SO | SI |
| 1. | DLE | DC1 | DC2 | DC3 | DC4 | NAK | SYN | ETB | CAN | EM | SUB | ESC | FS | GS | RS | US |
| 2. | | ! | " | # | \$ | % | & | ' | (|) | * | + | , | - | . | / |
| 3. | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | : | ; | < | = | > | ? |
| 4. | @ | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O |
| 5. | P | Q | R | S | T | U | V | W | X | Y | Z | [| \ |] | ^ | _ |
| 6. | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 7. | p | q | r | s | t | u | v | w | x | y | z | { | | } | ~ | DEL |



cp858

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 8. | Ç | ü | é | â | ä | à | å | ç | ê | ë | è | ï | î | ì | Ä | Å |
| 9. | É | æ | Æ | ô | ö | ò | û | ù | ÿ | Ö | Ü | ø | £ | Ø | × | f |
| A. | á | í | ó | ú | ñ | Ñ | ª | º | ¿ | ® | ¬ | ½ | ¼ | ¡ | « | » |
| B. | ■ | ■ | ■ | | ┌ | Á | Â | À | © | ≡ | | ⌋ | ⌌ | ¢ | ¥ | └ |
| C. | L | ┌ | ┐ | └ | — | + | ã | Ã | ⌌ | ⌋ | ≡ | ≡ | ≡ | ≡ | ≡ | ⌘ |
| D. | ď | Đ | Ê | Ë | È | € | í | î | ï | └ | ┌ | ■ | ■ | ! | ì | ■ |
| E. | Ó | β | Ô | Ò | õ | Õ | μ | þ | Ɔ | Ú | Û | Ù | ý | Ý | - | ' |
| F. | SHY | ± | = | ¾ | ¶ | § | ÷ | , | ° | ¨ | . | 1 | 3 | 2 | ■ | NBSP |

cp862

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 8. | א | ב | ג | ד | ה | ו | ז | ח | ט | י | ך | כ | ל | ם | מ | ן |
| 9. | נ | ס | ע | ף | פ | ץ | צ | ק | ר | ש | ת | ¢ | £ | ¥ | ₪ | f |
| A. | á | í | ó | ú | ñ | Ñ | ª | º | ¿ | ® | ¬ | ½ | ¼ | ¡ | « | » |
| B. | ■ | ■ | ■ | | ┌ | Á | Â | À | © | ≡ | | └ | ┘ | ¢ | ¥ | ¬ |
| C. | L | ┌ | ┐ | └ | — | + | ã | Ã | └ | ┘ | ≡ | ≡ | ≡ | ≡ | ≡ | ≡ |
| D. | ≡ | ≡ | ≡ | └ | ┘ | ≡ | ≡ | ≡ | ≡ | └ | ┘ | ■ | ■ | ■ | ■ | ■ |
| E. | α | β | Γ | π | Σ | σ | μ | τ | Φ | Θ | Ω | δ | ∞ | φ | ε | ∩ |
| F. | ≡ | ± | ≥ | ≤ | ∫ | J | ÷ | ≈ | ◦ | • | • | √ | n | ² | ■ | NBSP |

cp869

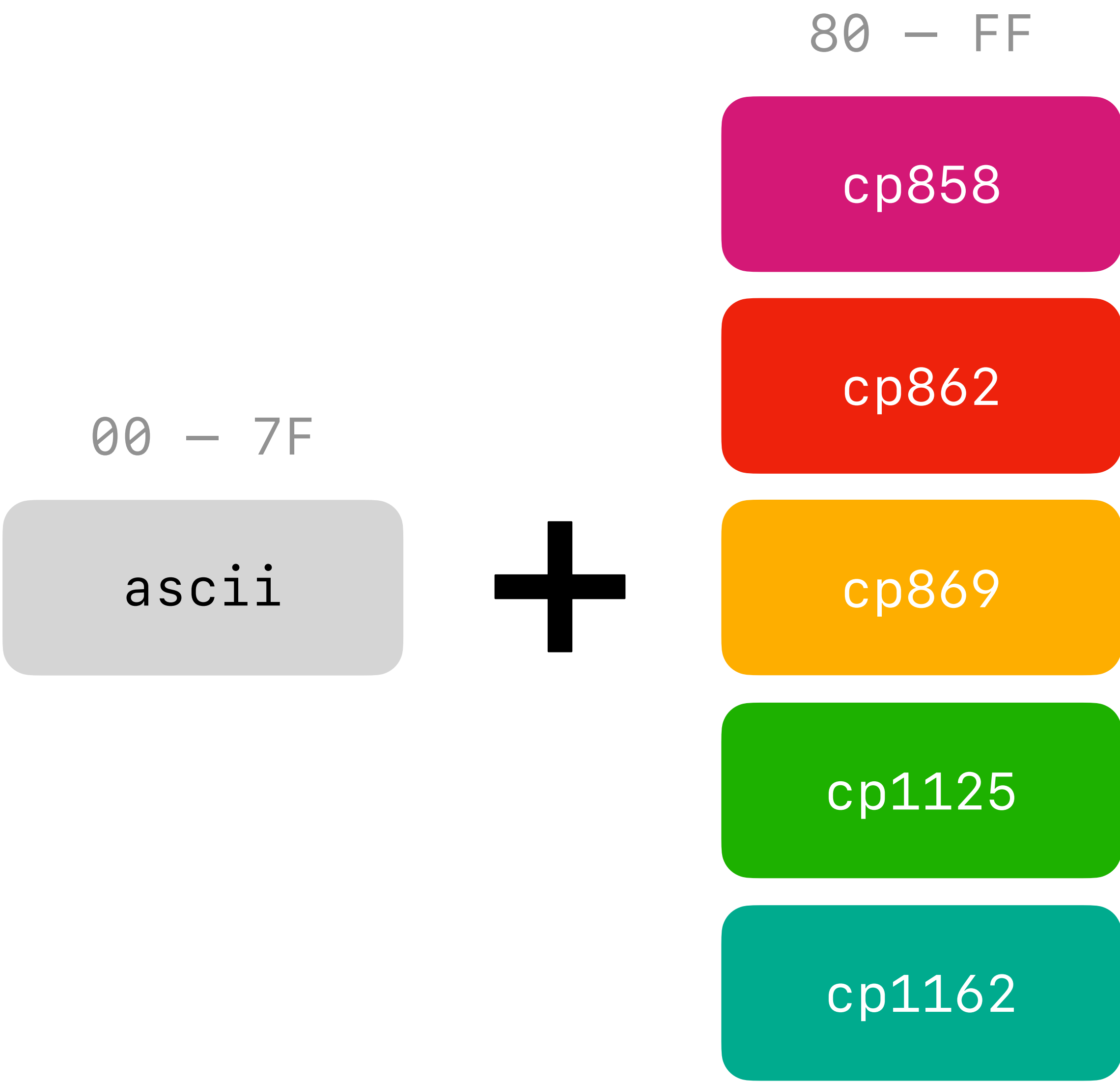
| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 8. | | | | | | | À | € | · | ¬ | ¡ | ' | ' | Έ | — | Ή |
| 9. | ı | ï | Ό | | | Υ | ÿ | © | Ω | ² | ³ | ά | £ | έ | ή | ί |
| A. | ï | ï | ό | ύ | A | B | Γ | Δ | E | Z | H | ½ | Θ | I | « | » |
| B. | | | | | ⊥ | K | Λ | M | N | ≡ | | ⊥ | ⊥ | ≡ | O | ¬ |
| C. | L | ⊥ | ⊥ | ⊥ | — | + | Π | P | ⊥ | ⊥ | ≡ | ≡ | ⊥ | ≡ | ≡ | Σ |
| D. | T | Υ | Φ | X | Ψ | Ω | α | β | γ | ⊥ | ⊥ | | | δ | ε | |
| E. | ζ | η | θ | ι | κ | λ | μ | ν | ξ | ο | π | ρ | σ | ς | τ | ' |
| F. | SHY | ± | υ | φ | χ | ξ | ψ | “ | ◦ | ¨ | ω | ü | ÿ | ώ | | NBSP |

cp1125

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 8. | А | Б | В | Г | Д | Е | Ж | З | И | Й | К | Л | М | Н | О | П |
| 9. | Р | С | Т | У | Ф | Х | Ц | Ч | Ш | Щ | Ъ | Ы | Ь | Э | Ю | Я |
| A. | а | б | в | г | д | е | ж | з | и | й | к | л | м | н | о | п |
| B. | | | | | ┌ | ≠ | ┐ | └ | ≠ | | ┐ | ┌ | ┐ | ≠ | └ | |
| C. | L | ┌ | ┐ | └ | — | + | F | ┐ | ┌ | ≠ | ≠ | ≠ | ≠ | ≠ | ≠ | |
| D. | ≠ | ≠ | ≠ | ┌ | ┐ | F | ┐ | ≠ | ≠ | ┐ | ┐ | ■ | ■ | ■ | ■ | |
| E. | р | с | т | у | ф | х | ц | ч | ш | щ | ъ | ы | ь | э | ю | я |
| F. | Ё | ё | Г | г | Є | є | І | і | Ї | ї | · | √ | Nº | Ɱ | ■ | NBSP |

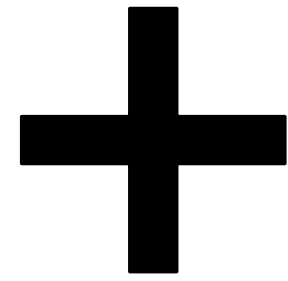
cp1162

| | .0 | .1 | .2 | .3 | .4 | .5 | .6 | .7 | .8 | .9 | .A | .B | .C | .D | .E | .F |
|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|------|
| 8. | € | | | | | ... | | | | | | | | | | |
| 9. | | ' | ' | " | " | . | - | — | | | | | | | | |
| A. | ̀ | ก | ข | ช | ค | ค | ฃ | ง | จ | ฉ | ช | ช | ฅ | ญ | ฎ | ฏ |
| B. | ฐ | ท | ฒ | ณ | ด | ต | ถ | ท | ธ | น | บ | ป | ผ | ฝ | พ | ฟ |
| C. | ภ | ม | ย | ร | ฤ | ล | ภ | ว | ศ | ษ | ส | ห | ฬ | อ | ฮ | ฯ |
| D. | ๕ | ั | า | ำ | ิ | ี | ึ | ุ | ู | ุ | ็ | ๋ | ้ | ๊ | ๋ | ฿ |
| E. | เ | แ | โ | ใ | ไ | า | ฯ | ั | ็ | ๋ | ็ | ้ | ๊ | ๋ | ็ | ๐ |
| F. | ๐ | ๑ | ๒ | ๓ | ๔ | ๕ | ๖ | ๗ | ๘ | ๙ | ฯ | ☛ | ¢ | ↳ | ¦ | NBSP |



00 - 7F

ascii



| | | | | |
|-------|--------|--------|-----------|-------------|
| cp437 | cp860 | cp1119 | cp3841 | rk1048 |
| cp720 | cp861 | cp1125 | cp3843 | windows1250 |
| cp737 | cp862 | cp1162 | cp3844 | windows1251 |
| cp775 | cp863 | cp2001 | cp3845 | windows1252 |
| cp850 | cp864 | cp3001 | cp3846 | windows1253 |
| cp851 | cp865 | cp3002 | cp3847 | windows1254 |
| cp852 | cp866 | cp3011 | cp3848 | windows1255 |
| cp853 | cp869 | cp3012 | iso88591 | windows1256 |
| cp855 | cp874 | cp3021 | iso88592 | windows1257 |
| cp857 | cp1098 | cp3041 | iso88597 | windows1258 |
| cp858 | cp1118 | cp3840 | iso885915 | |

^{1B 40} ESC ^{1B 74} ESC t n=cp858 Welcome to ^{0A} LF

iñtërnâtiônàlizætión ^{0A} LF

before Unicode ^{0A} LF

^{1D 56 00} GS V 0

U+00F1
↓
A4

U+00E2
↓
83

U+00E0
↓
85

U+00F8
↓
9B

iñtërnâtiônàlizætìon

U+00EB
↓
89

U+00F4
↓
93

U+00E6
↓
91

CodepageEncoder

<https://github.com/NielsLeenheer/CodepageEncoder>



```
import CodepageEncoder from 'codepage-encoder';  
CodepageEncoder.encode('Iñtërnâtiônàlizætìon before Unicode', 'cp858');
```

```
Uint8Array(33) [  
  73, 164, 116, 137, 114, 110, 131,  
 116, 105, 147, 110, 133, 108, 105,  
 122, 145, 116, 105, 155, 110, 32,  
 98, 101, 102, 111, 114, 101, 32,  
 85, 110, 105, 99, 111, 100, 101  
]
```




Epson TM-88IV

| | | | | | | | | | |
|----|-------|----|--------|----|--------|----|-----------|-------------|-------------|
| 00 | cp437 | 03 | cp860 | 2b | cp1119 | | 35 | rk1048 | |
| 20 | cp720 | 23 | cp861 | 2c | cp1125 | | 2d | windows1250 | |
| 0e | cp737 | 24 | cp862 | | | | 2e | windows1251 | |
| 21 | cp775 | 04 | cp863 | | | | 10 | windows1252 | |
| 02 | cp850 | 25 | cp864 | | | | 2f | windows1253 | |
| 0b | cp851 | 05 | cp865 | | | | 30 | windows1254 | |
| 12 | cp852 | 11 | cp866 | | | | 31 | windows1255 | |
| 0c | cp853 | 26 | cp869 | | | | 32 | windows1256 | |
| 22 | cp855 | | | | | 27 | iso88592 | 33 | windows1257 |
| 0d | cp857 | 29 | cp1098 | | | 0f | iso88597 | 34 | windows1258 |
| 13 | cp858 | 2a | cp1118 | | | 28 | iso885915 | | |



Bixolon SRP-350III

| | | | | | | |
|----|-------|----|-------|--|--|--|
| 00 | cp437 | 03 | cp860 | | | |
| | | | | | | |
| | | | | | | |
| | | 04 | cp863 | | | |
| 02 | cp850 | | | | | |
| 0b | cp851 | 05 | cp865 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 13 | cp858 | | | | | |



Zjiang ZJ-5805

| | | | | | | | | | |
|----|-------|----|--------|----|--------|----|--------|----|-------------|
| 00 | cp437 | 03 | cp860 | 44 | cp1119 | | | | |
| 5d | cp720 | 38 | cp861 | | | 4c | cp3843 | 48 | windows1250 |
| 40 | cp737 | 3e | cp862 | | | 4d | cp3844 | 49 | windows1251 |
| 5f | cp775 | 04 | cp863 | 53 | cp2001 | 4e | cp3845 | 10 | windows1252 |
| 02 | cp850 | 3f | cp864 | 54 | cp3001 | 4f | cp3846 | 5a | windows1253 |
| 41 | cp851 | 05 | cp865 | 55 | cp3002 | 50 | cp3847 | 5b | windows1254 |
| 12 | cp852 | 11 | cp866 | 56 | cp3011 | 51 | cp3848 | 20 | windows1255 |
| | | 42 | cp869 | 57 | cp3012 | | | 5c | windows1256 |
| 3c | cp855 | | | 58 | cp3021 | | | | |
| 3d | cp857 | | | 59 | cp3041 | | | 5e | windows1258 |
| 13 | cp858 | 45 | cp1118 | 4a | cp3840 | | | | |



Citizen CTS-310II

| | | | | | | | |
|----|-------|----|-------|--|--|----|-------------|
| 00 | cp437 | 03 | cp860 | | | | |
| | | | | | | | |
| | | | | | | | |
| | | 04 | cp863 | | | 10 | windows1252 |
| 02 | cp850 | 28 | cp864 | | | | |
| | | 05 | cp865 | | | | |
| 12 | cp852 | 11 | cp866 | | | | |
| | | | | | | | |
| | | | | | | | |
| 08 | cp857 | | | | | | |
| 13 | cp858 | | | | | | |

But what about images?



salonhub

De Millystraat 7
9471 AG Zuidlaren
The Netherlands

www.salonhub.nl
info@salonhub.nl

Date: 2-9-2023 11:58:02
Employee: Stefan

Womens Cut Full
Finish

Blowdry

Elvive
Multivitamines
2-in-1 Shampoo 250
ml

Total

€ 83,00

€ 57,00

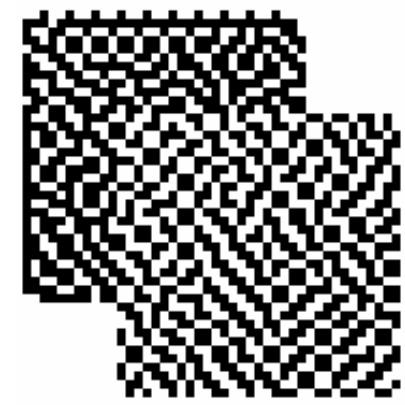
Thanks for
this d
her





The logo consists of two overlapping gray squares, with the top-left square partially behind the bottom-right square.

salonhub



salonhub

1-bit dithering using
the Atkinson algorithm



Bill Atkinson, creator of QuickDraw, MacPaint and HyperCard on the right, some other guy on the left. Photo taken in 1984.

CanvasDither

<https://github.com/NielsLeenheer/CanvasDither>



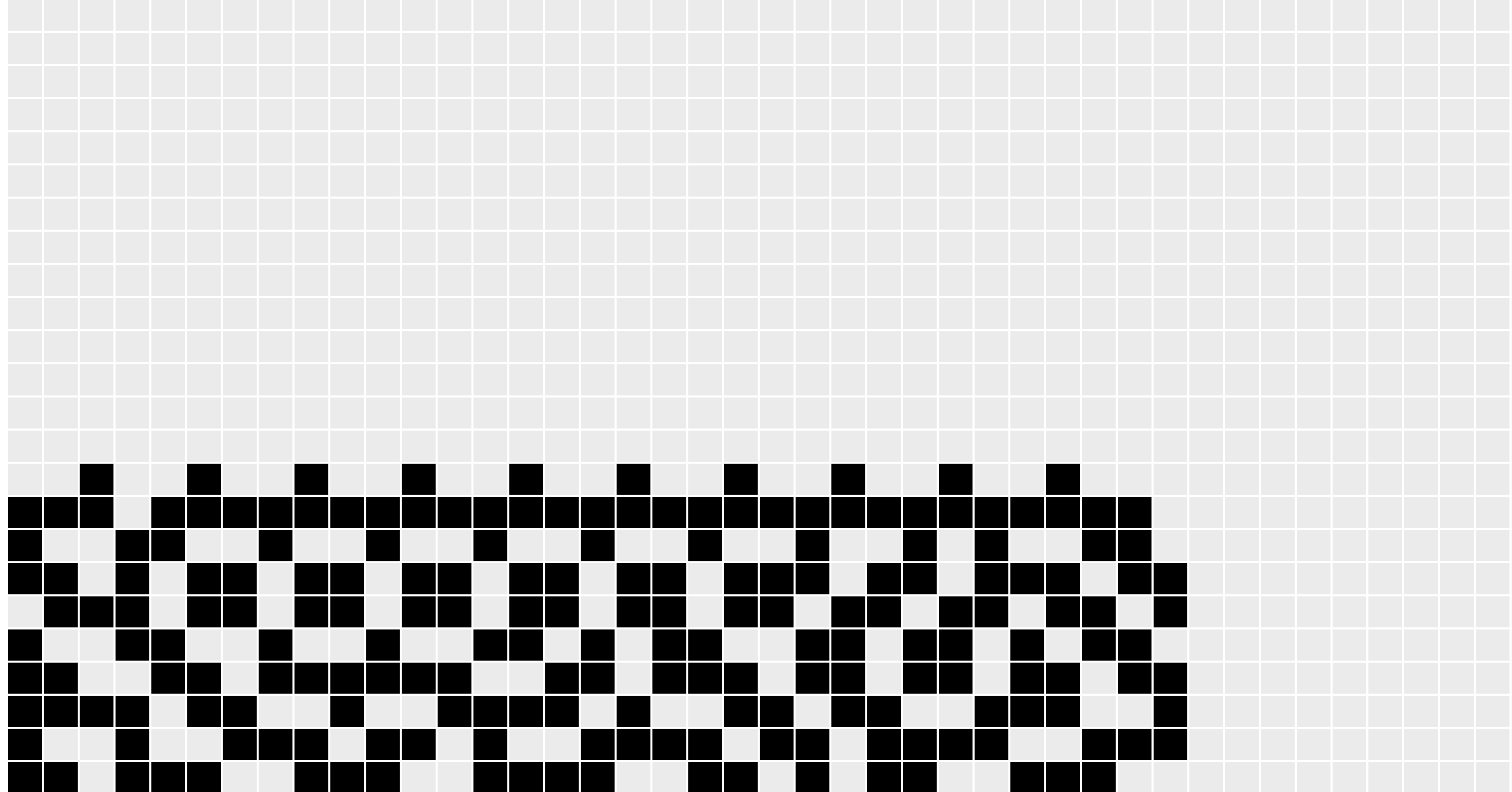
```
import Dither from 'canvas-dither';

let image = context.getImageData(0, 0, canvas.width, canvas.height);
image = Dither.atkinson(image);
context.putImageData(image, 0, 0);
```


72px

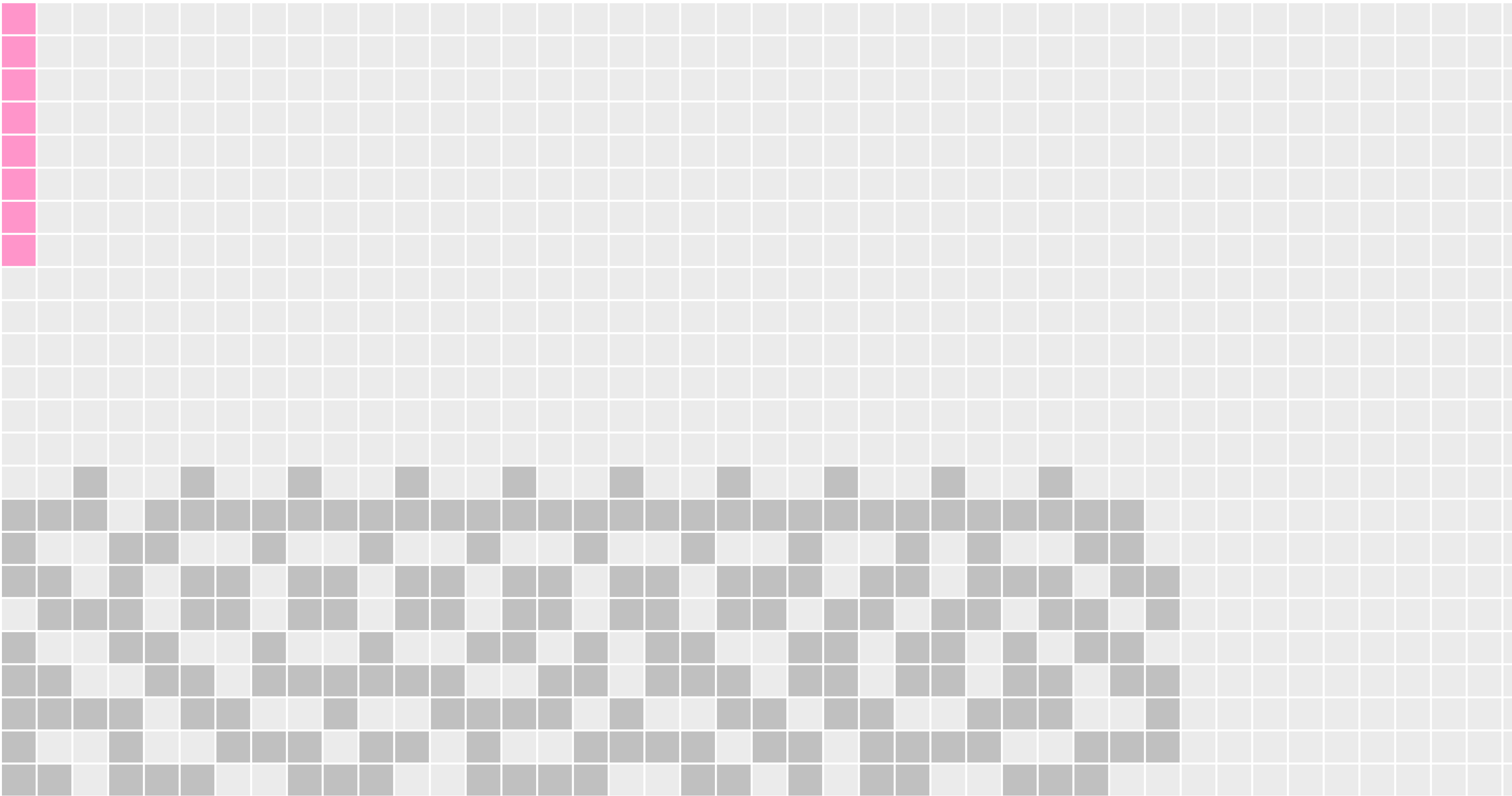






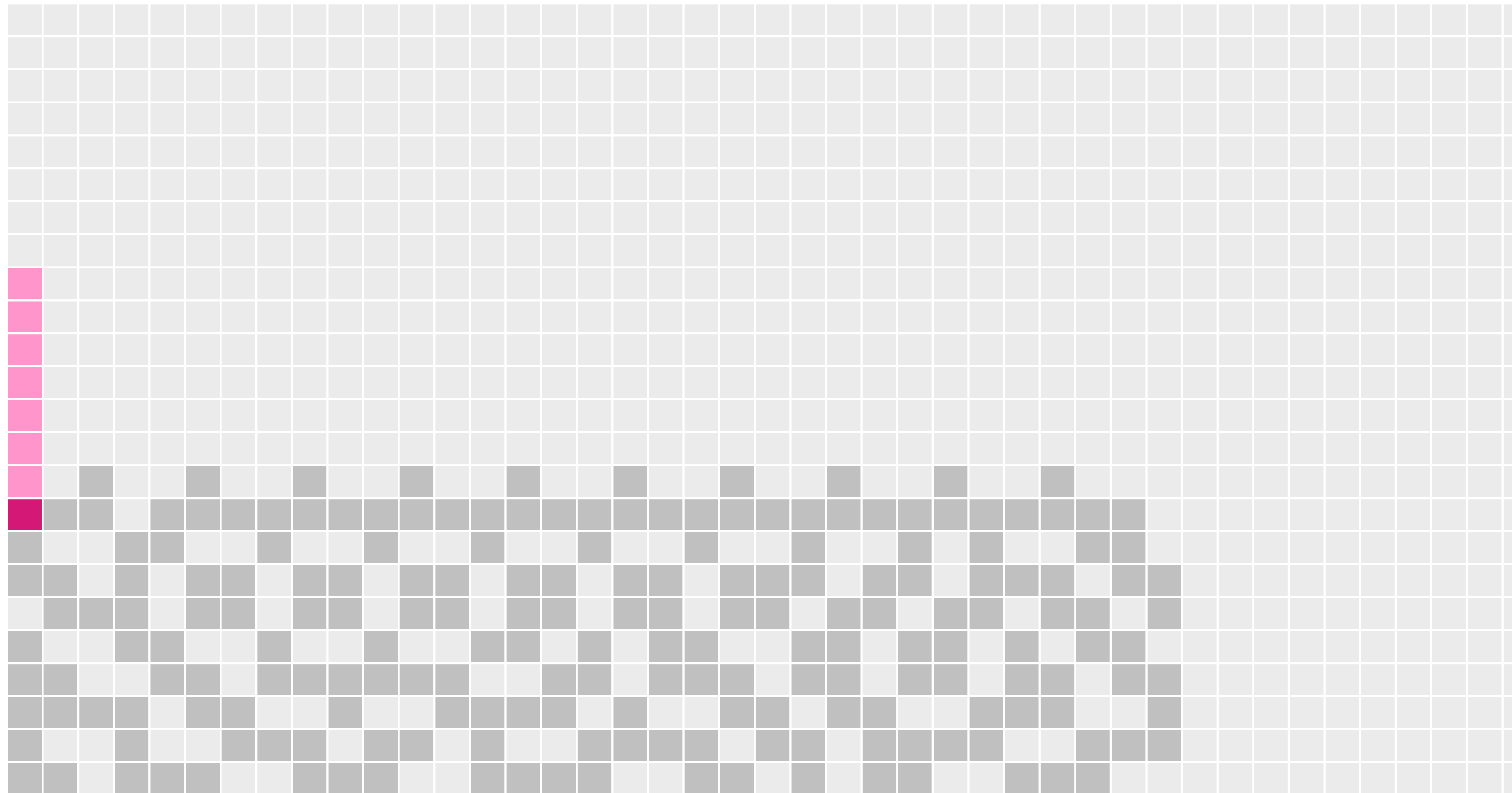
0000 0000
0
00

MSB
LSB



0000 0001
1
01

MSB
LSB



1101

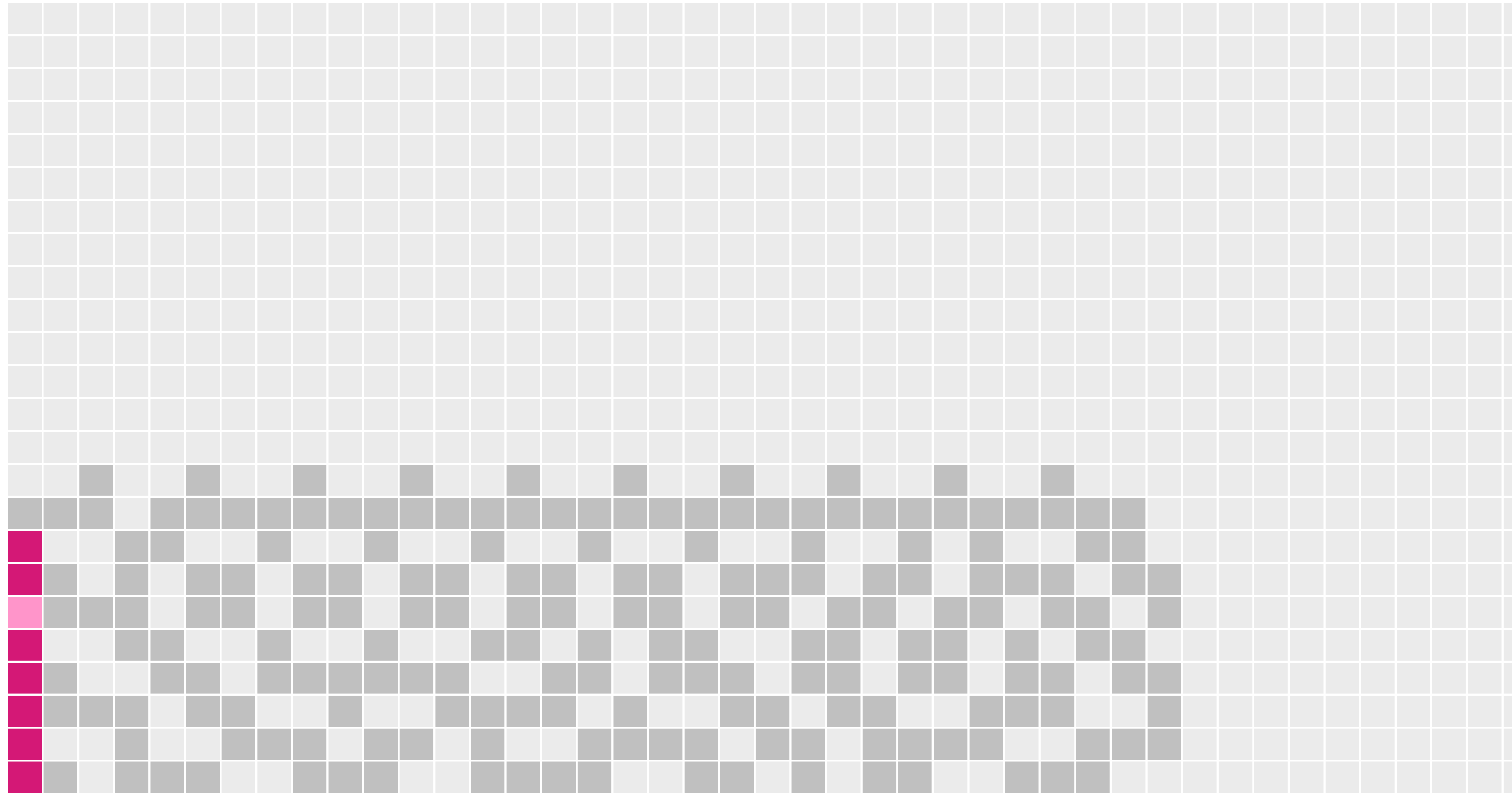
1111

223

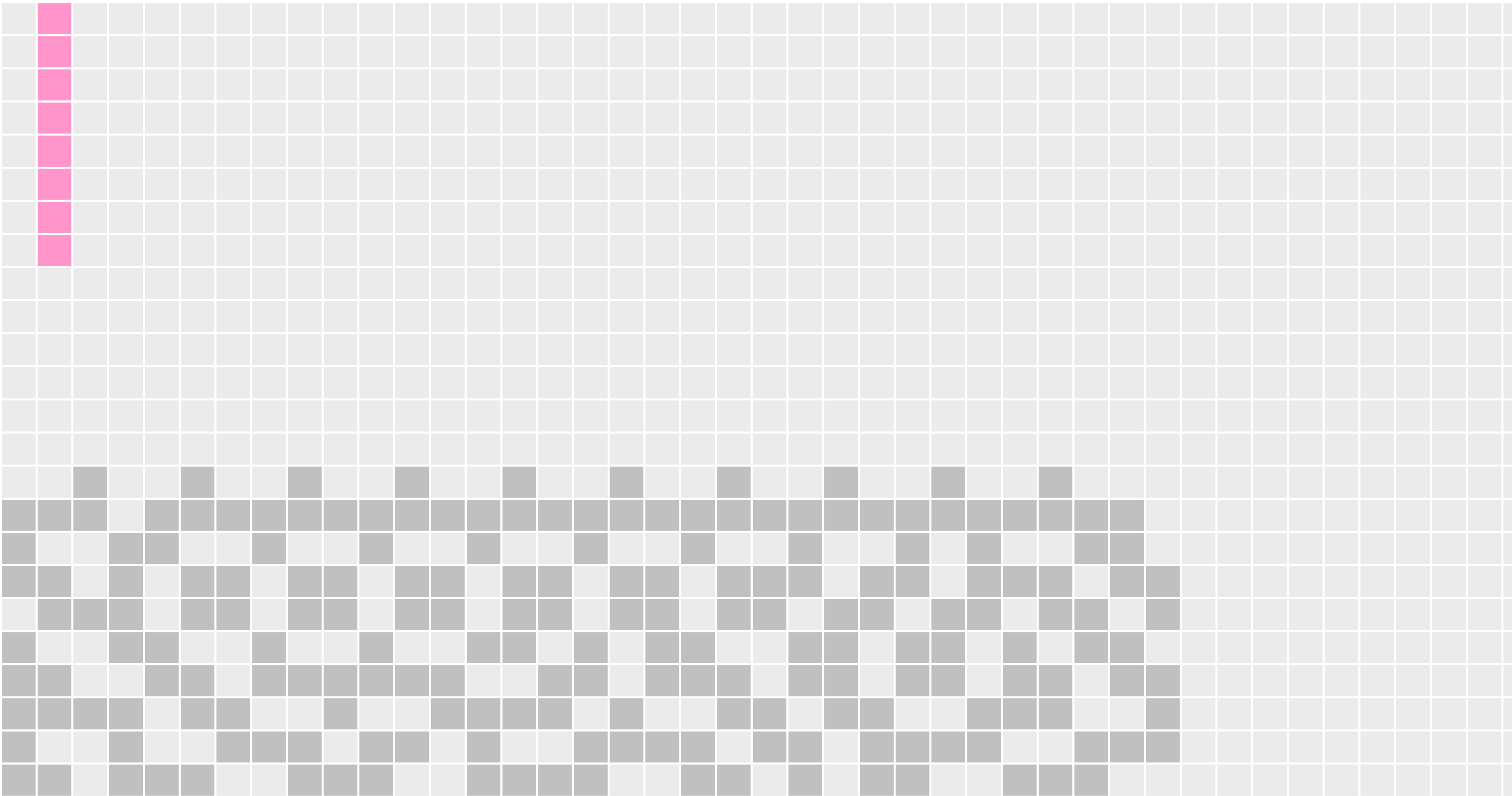
DF

MSB

LSB

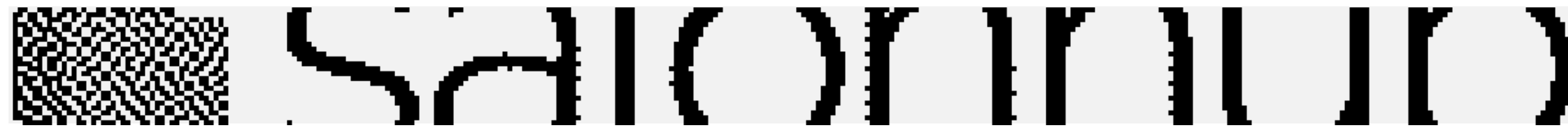


0000 0000
0
00
MSB
LSB



salonmuid
salonmuid
salonmuid

00 01 DF 00 01 6D 00 03 36 00 00 F7 ...



00 01 DF 00 01 6D 00 03 36 00 00 F7 ...

7F FF FE D3 34 E6 9C D7 3B 6D DB 9D ...



00 01 DF 00 01 6D 00 03 36 00 00 F7 ...

7F FF FE D3 34 E6 9C D7 3B 6D DB 9D ...

00 00 00 00 00 00 00 00 00 00 00 00 ...

w = image width = 320 dots
m = 24 dots, double density = 33
nL = w & 0xff = 64
nH = (w >> 8) & 0xff = 1

ESC * m nL nH

00 01 DF 00 01 6D 00 03 36 00 00 F7 ...

LF

ESC * m nL nH

7F FF FE D3 34 E6 9C D7 3B 6D DB 9D ...

LF

ESC * m nL nH

00 00 00 00 00 00 00 00 00 00 00 00 ...

LF

w = image width = 320 dots
m = 24 dots, double density = 33
nL = w & 0xff = 64
nH = (w >> 8) & 0xff = 1

ESC | 3 | n=24

ESC | * | m | nL | nH

ESC | * | m | nL | nH

ESC | * | m | nL | nH

ESC | 3 | n=34

00 01 DF 00 01 6D 00 03 36 00 00 F7 ...

7F FF FE D3 34 E6 9C D7 3B 6D DB 9D ...

00 00 00 00 00 00 00 00 00 00 00 00 ...

LF

LF

LF

```
w = image width = 320 dots
m = 24 dots, double density = 33
nL = w & 0xff = 64
nH = (w >> 8) & 0xff = 1
```

ESC 3 n=24

ESC * m nL nH

ESC * m nL nH

ESC * m nL nH

ESC 3 n=34



LF

LF

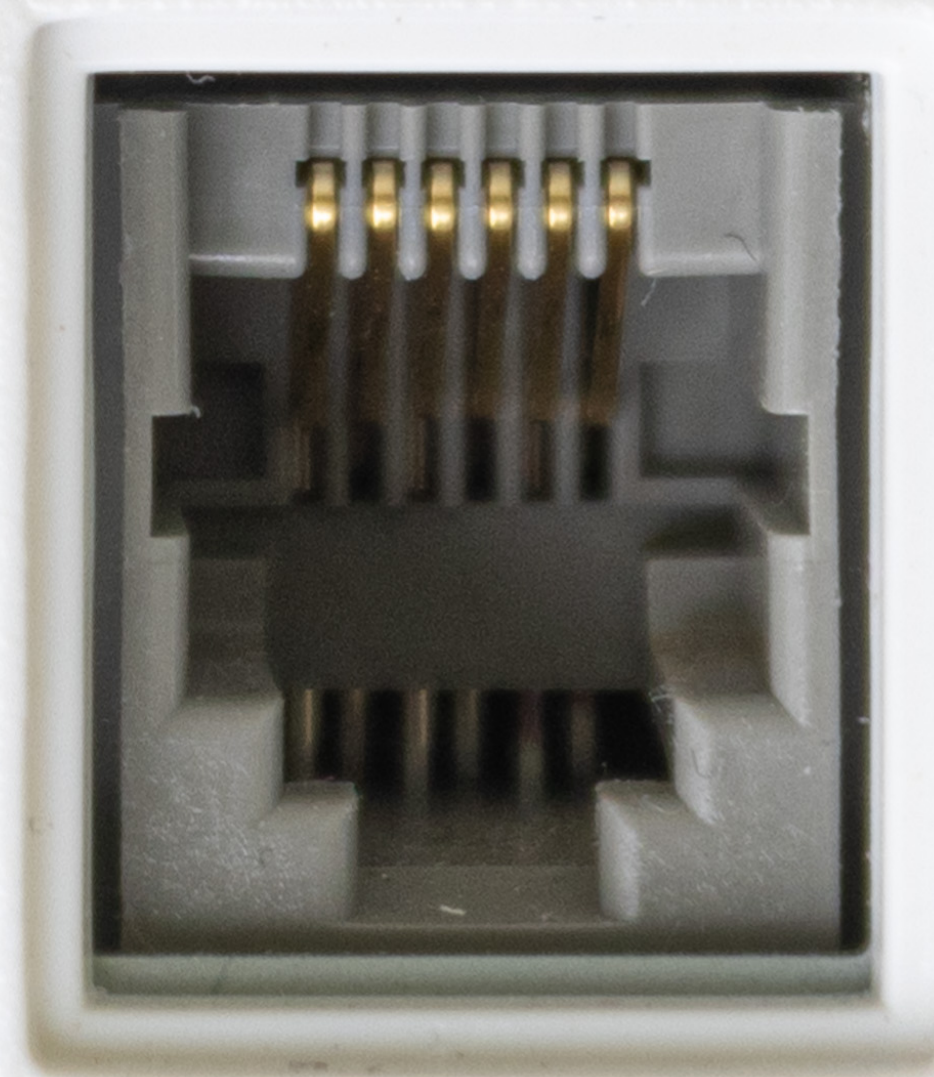
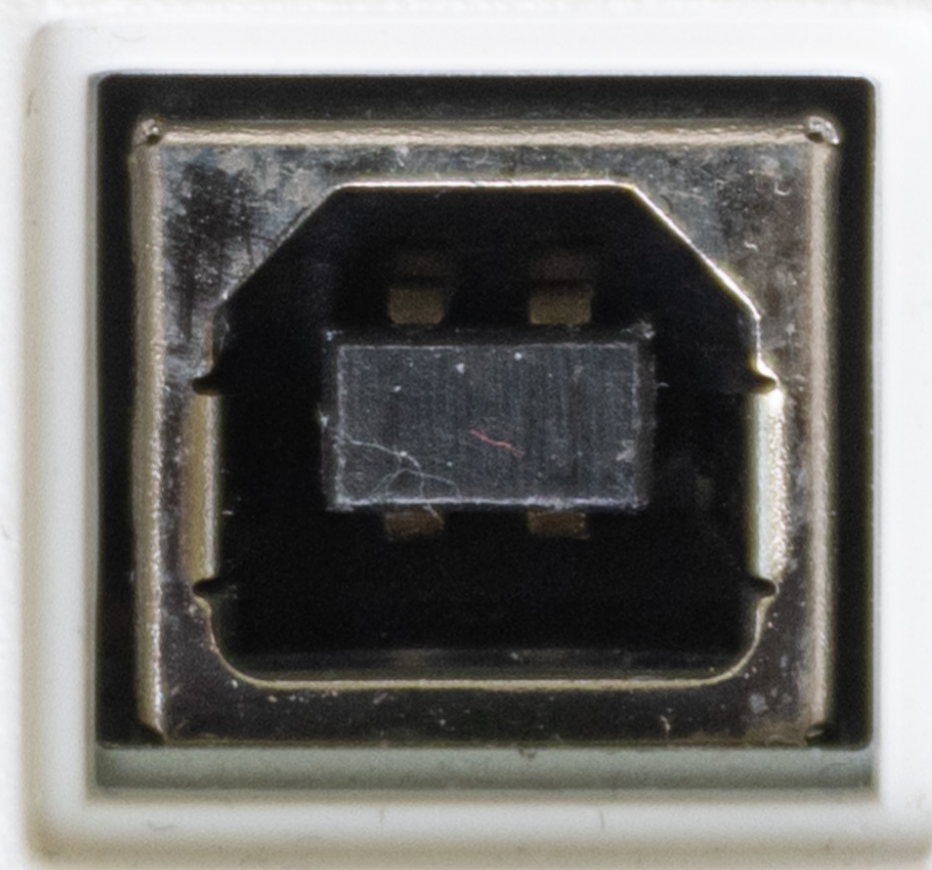
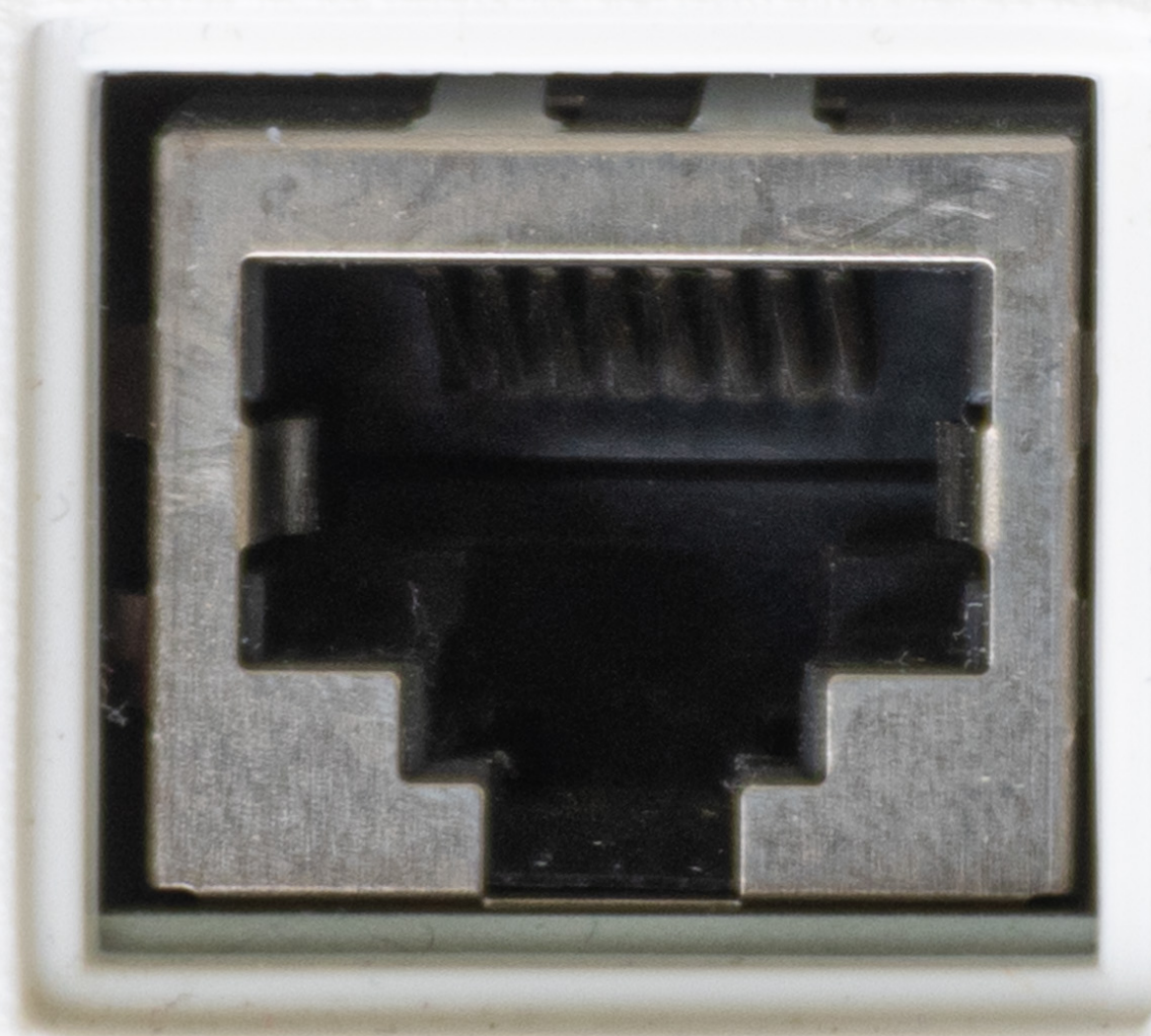
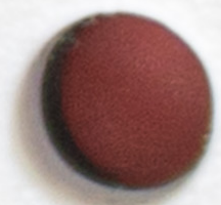
LF



Cash drawer

Send a pulse
to the DK port

ESC | p | m | t1 | t2



RESET

LAN



DK Δ

DC24V

EscPosEncoder

<https://github.com/NielsLeenheer/EscPosEncoder>



```
import EscPosEncoder from 'esc-pos-encoder.esm.js';

let encoder = new EscPosEncoder();
let payload = encoder
  .initialize()
  .text('Welcome to').newline()
  .bold().text('DevFest Hamburg').bold().newline()
  .cut()
  .encode();

// To do: Send the contents of payload to the printer
```


But wait...



 salonhub

De Millijstraat 7
9471 AG Zuidlaren
The Netherlands

www.salonhub.nl
info@salonhub.nl

Date: 2-9-2023 11:58:02
Employee: Stefan

Womens Cut Full € 83,00
Finish

Blowdry € 57,00

E|vive
Multivitamines 250

m1 € 5,39
=====

Total € 145,39

Thanks for your interest in
this demo! Enjoy your time
here at Google I/O Connect!

StarPRNT - pretty much the same as ESC/POS,
except all the escape commands and codepages are different.

1B 40 1B 74 13 0A
ESC | @ ESC | t | n=cp858 Welcome to LF

1B 45 01 1B 45 00 0A
ESC | E | 1 DevFest Hamburg ESC | E | 0 LF

1D 56 00
GS | V | 0

1B 40 18
ESC | @ | CAN

1B 74 13
ESC | t | n=cp858

Welcome to LF

1B 45 01
ESC | E | 1

DevFest Hamburg

1B 45 00 0A
ESC | E | 0 LF

1D 56 00
GS | V | 0

1B 40 18
ESC @ CAN

1B 1D 74 04
ESC GS t n=cp858

Welcome to LF

1B 45 01
ESC E 1

DevFest Hamburg

1B 45 00 0A
ESC E 0 LF

1D 56 00
GS V 0

1B 40 18
ESC @ CAN

1B 1D 74 04
ESC GS t n=cp858

Welcome to LF

1B 45
ESC E

DevFest Hamburg

1B 46
ESC F

0A
LF

1D 56 00
GS V 0

1B 40 18
ESC @ CAN

1B 1D 74 04
ESC GS t n=cp858

Welcome to LF

1B 45
ESC E

DevFest Hamburg

1B 46
ESC F

0A
LF

1B 64 00
ESC d 0

StarPrntEncoder

<https://github.com/NielsLeenheer/StarPrntEncoder>

StarPrntEncoder

<https://github.com/NielsLeenheer/StarPrntEncoder>

Receipt printers are a big mess





ThermalPrinterEncoder

<https://github.com/NielsLeenheer/ThermalPrinterEncoder>



```
import ThermalPrinterEncoder from 'thermal-printer-encoder.esm.js';

let encoder = new ThermalPrinterEncoder({
  language: 'esc-pos',
  codepageMapping: 'epson'
});

let payload = encoder
  .initialize()
  .text('Welcome to').newline()
  .bold().text('DevFest Hamburg').bold().newline()
  .cut()
  .encode();
```

```
let encoder = new ThermalPrinterEncoder({
  language: 'esc-pos',
  codepageMapping: 'epson'
});

let payload = encoder
  .initialize()
  .text('Welcome to').newline()
  .bold().text('DevFest Hamburg').bold().newline()
  .cut()
  .encode();

// To do: Send the contents of payload to the printer
```


WebUSBReceiptPrinter

<https://github.com/NielsLeenheer/WebUSBReceiptPrinter>



```
import WebUSBReceiptPrinter from 'webusb-receipt-printer.esm.js';

const receiptPrinter = new WebUSBReceiptPrinter();
await receiptPrinter.connect();

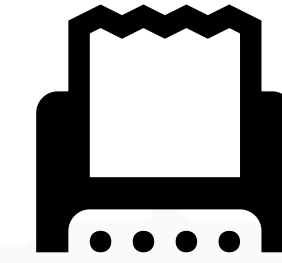
/* Send the contents of payload to the printer */
receiptPrinter.print(payload);
```

WebSerialReceiptPrinter

<https://github.com/NielsLeenheer/WebSerialReceiptPrinter>

WebBluetoothReceiptPrinter

<https://github.com/NielsLeenheer/WebBluetoothReceiptPrinter>



Connect with WebUSB



Connect with WebSerial



Connect with WebBluetooth

Receipt width



32 characters

35 characters

A black rectangular digital display sign is mounted on a white cylindrical stand. The sign's screen shows the text "Welcome to Salonhub" in a green, pixelated font. The background is a bright, out-of-focus window with a vase of dried branches on a table.

Welcome to
Salonhub

Customer display

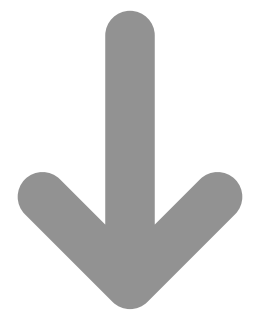
What language do customer displays speak?



FL L2 94Y-0 2 129

1B 40

ESC @



1B 3D 0

ESC = 0

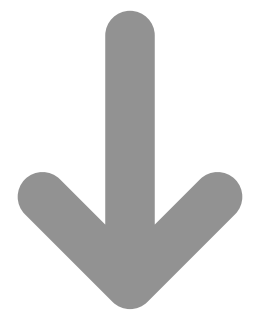
1B 3D 1

ESC = 1



1B 40

ESC @



1B 3D 0

ESC = 0

1B 3D 1

ESC = 1





```
let port = await navigator.serial.requestPort();
```




```
let port = await navigator.serial.requestPort();
```

```
  await port.open({  
    baudRate: 9600  
  });
```




```
let port = await navigator.serial.requestPort();
```

```
  await port.open({  
    baudRate: 9600  
  });
```

```
let writer = port.writable.getWriter();  
await writer.write(payload);
```





FL 12 54Y-0 2 129

FL 12 54Y-0 2 129



But wait...

Let's talk about USB device classes




ADC



CDC



HID



MSC



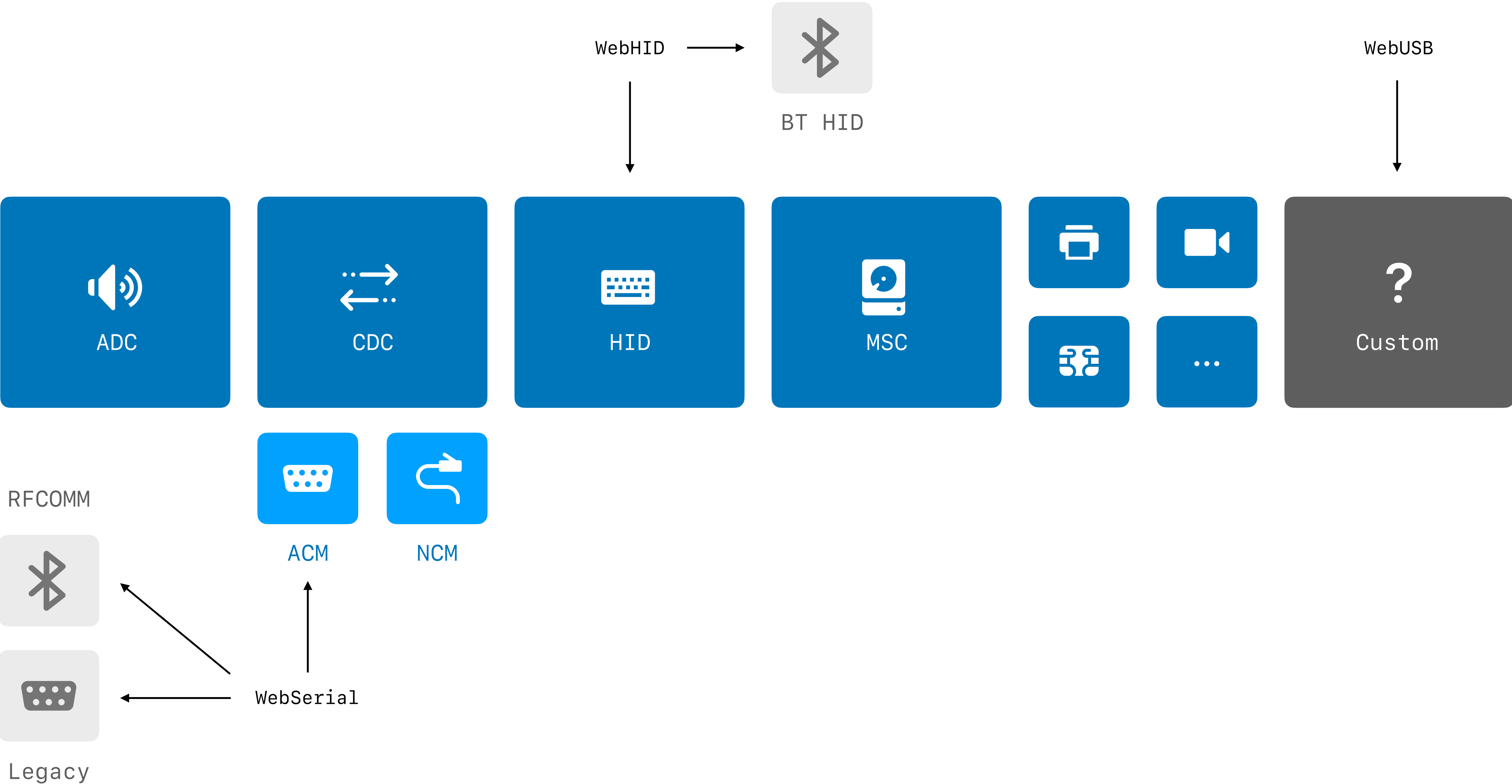
Custom

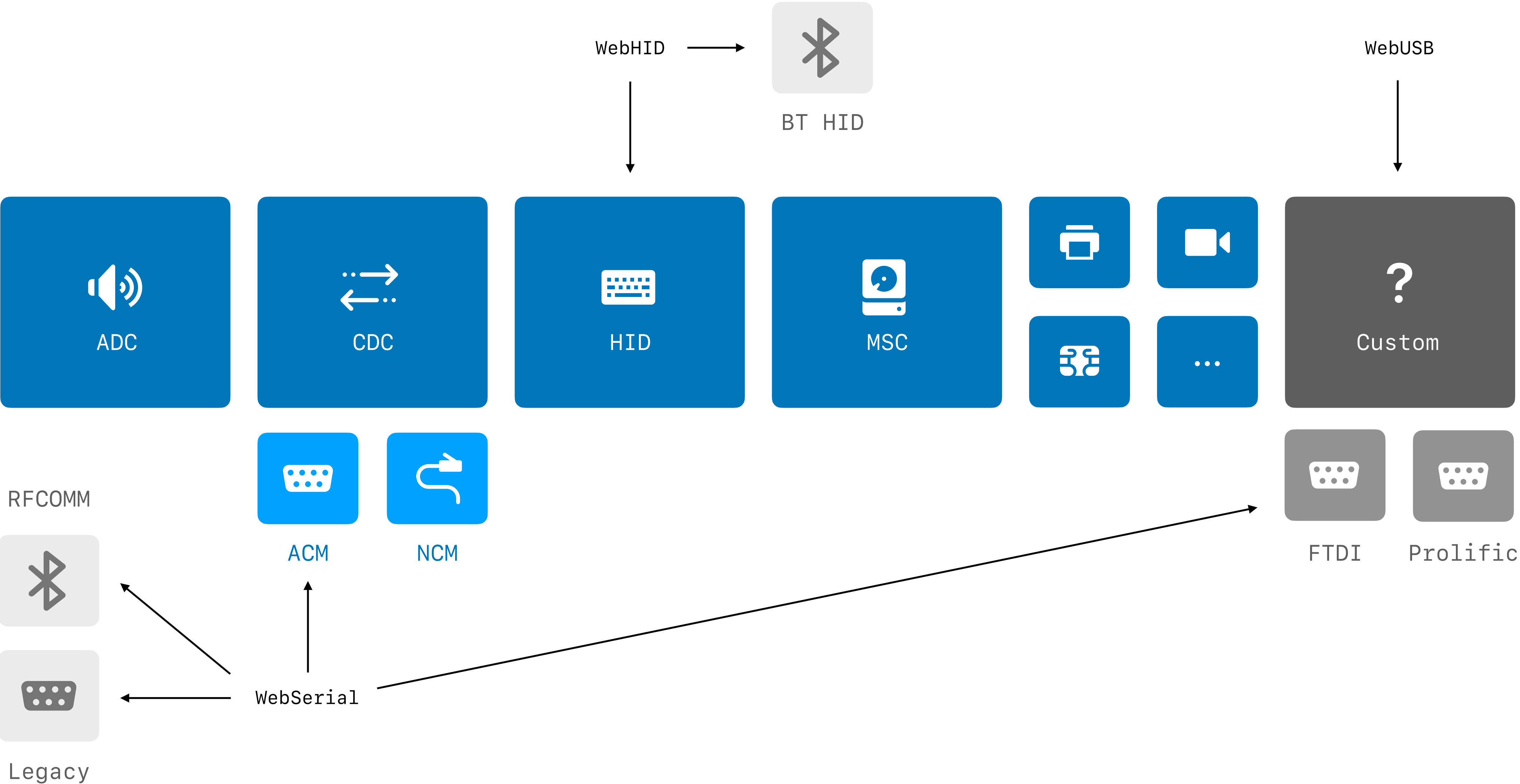


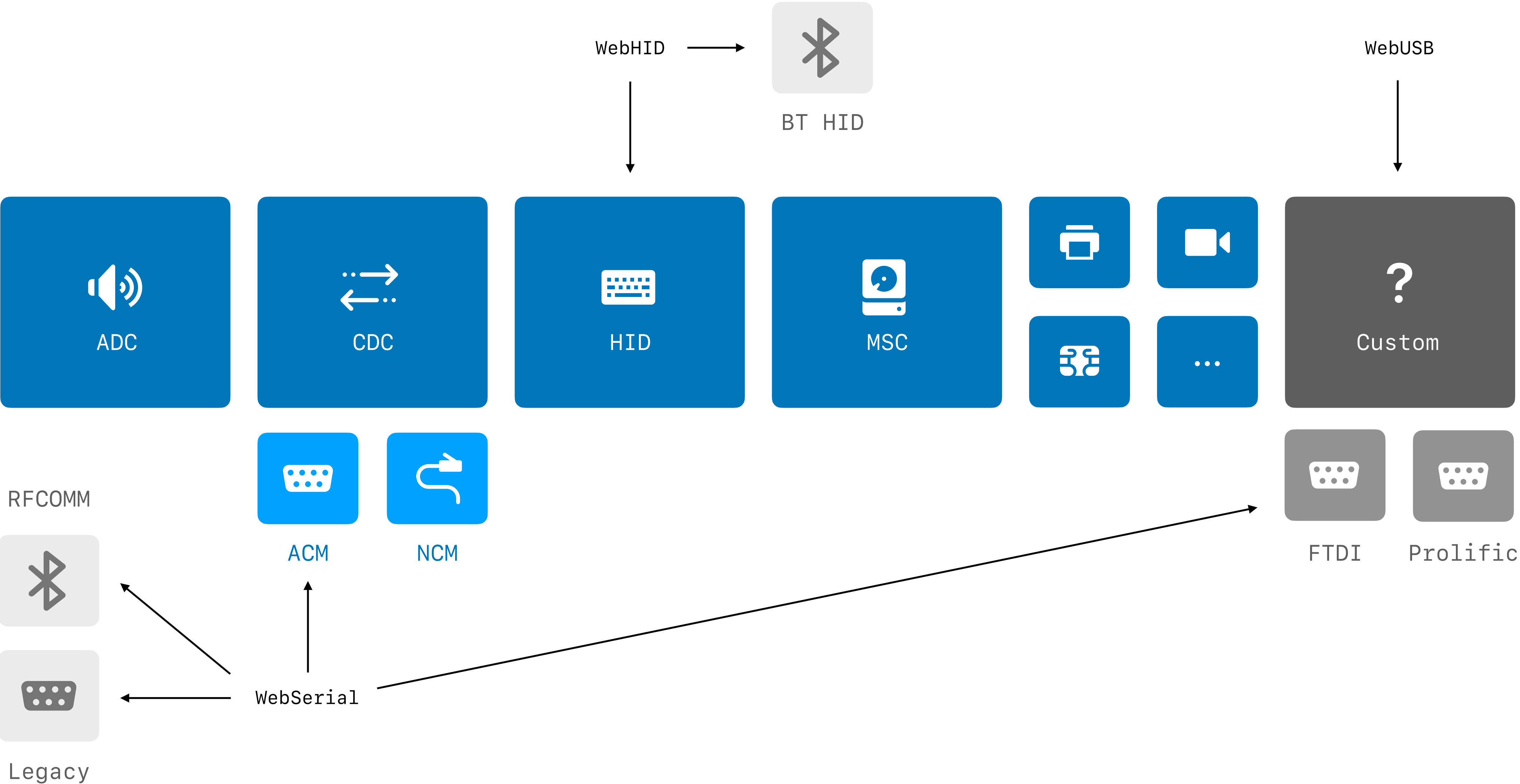
ACM



NCM







WebUSBSerial

<https://github.com/NielsLeenheer/WebUSBSerial>

WebUSBSerial

<https://github.com/NielsLeenheer/WebUSBSerial>

Serial ports are dead. Long live WebSerial.

WebSerialCustomerDisplay

<https://github.com/NielsLeenheer/WebSerialCustomerDisplay>



```
import WebSerialCustomerDisplay from 'webserial-customer-display.esm.js';

const customerDisplay = new WebSerialCustomerDisplay();
await customerDisplay.connect();

customerDisplay.line([
  "Connected with",
  "WebSerial"
]);
```


Barcode scanner



Barcode scanners are just keyboards...

..but WebHID allows us to get barcodes
instead of individual keystrokes



```
let devices = await navigator.hid.requestDevice({  
  filters: { vendorId: 0x0c2e }  
});
```

Honeywell Scanning & Mobility



```
let devices = await navigator.hid.requestDevice({  
  filters: { vendorId: 0x0c2e }  
});
```

```
let device = devices.find(d => d.collections.some(c => c.usagePage == 140));
```

Barcode scanner





```
let devices = await navigator.hid.requestDevice({
  filters: { vendorId: 0x0c2e }
});

let device = devices.find(d => d.collections.some(c => c.usagePage == 140));

if (device) {
  await device.sendFeatureReport(254, new Uint8Array([ 0x01 ]));
}
```

Turn off keyboard emulation and use HID reports





```
let devices = await navigator.hid.requestDevice({
  filters: { vendorId: 0x0c2e }
});

let device = devices.find(d => d.collections.some(c => c.usagePage == 140));

if (device) {
  await device.sendFeatureReport(254, new Uint8Array([ 0x01 ]));

  device.addEventListener('inputreport', event => {
    console.log(event.data);
  });
}
```

```
000000  0e 5d 45 30 33 34 37 34 36 33 30 36 31 38 36 39  .]E0347463061869
000010  35 0d 00 00 00 00 00 00 00 00 00 00 00 00 00 00  5.....
000020  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
000030  00 00 00 00 00 00 00 00 00 00 00 00 00 64 00 00  .....d..
```


Length of barcode = 14 characters

Value = 3474630618695

| | | | | | | | | | | | | | | | | | |
|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------------------|
| 000000 | 0e | 5d | 45 | 30 | 33 | 34 | 37 | 34 | 36 | 33 | 30 | 36 | 31 | 38 | 36 | 39 | .]E0347463061869 |
| 000010 | 35 | 0d | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 5..... |
| 000020 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | |
| 000030 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 64 | 00 | 00 | |d.. |

Symbology of barcode = EAN13

Is this the last report for this barcode? 0 = yes

WebHidBarcodeScanner

<https://github.com/NielsLeenheer/WebHidBarcodeScanner>



```
import WebHIDBarcodeScanner from 'webhid-barcode-scanner.esm.js';

const barcodeScanner = new WebHIDBarcodeScanner();
await barcodeScanner.connect();

barcodeScanner.addEventListener('barcode', e => {
  console.log(`Found barcode ${e.value} with symbology ${e.symbology}`);
});
```


WebSerialBarcodeScanner

<https://github.com/NielsLeenheer/WebSerialBarcodeScanner>



Customer screen

Any screen will do



```
const details = await window.getScreenDetails();  
console.log(details.screens);
```

```
[  
  {  
    width: 1024, height: 600  
    left: 2560, top: 1266,  
    label: "Sd700F_0716",  
    isPrimary: false, isExtended: true,  
    ...  
  },  
  {  
    width: 2560, height: 1440,  
    left: 0, top: 0,
```


External screen



SD700F_0716 (1024 × 600) ▾

Open popup as fullscreen window

Screen size

Small ▾

Font

Roboto Condensed ▾

Cancel

Save



```
/* Make the document fullscreen on a specific screen */
```

```
function openFullscreen(label) {
```

```
    let screens = await window.getScreenDetails();
```

```
    let screen = displays.screens.find(screen => screen.label === label);
```

```
    document.body.requestFullscreen({ screen });
```

```
}
```


Salonhub

salonhub.io/demo/

salonhub

Appointments Register Recipes Customers Team

Delete Multiple receipts End of day Open cashdrawer Previous receipt Pro forma receipt

Employee: Stefan

Discount Points

| | |
|---|----------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Total | € 94,68 |

Card Cash

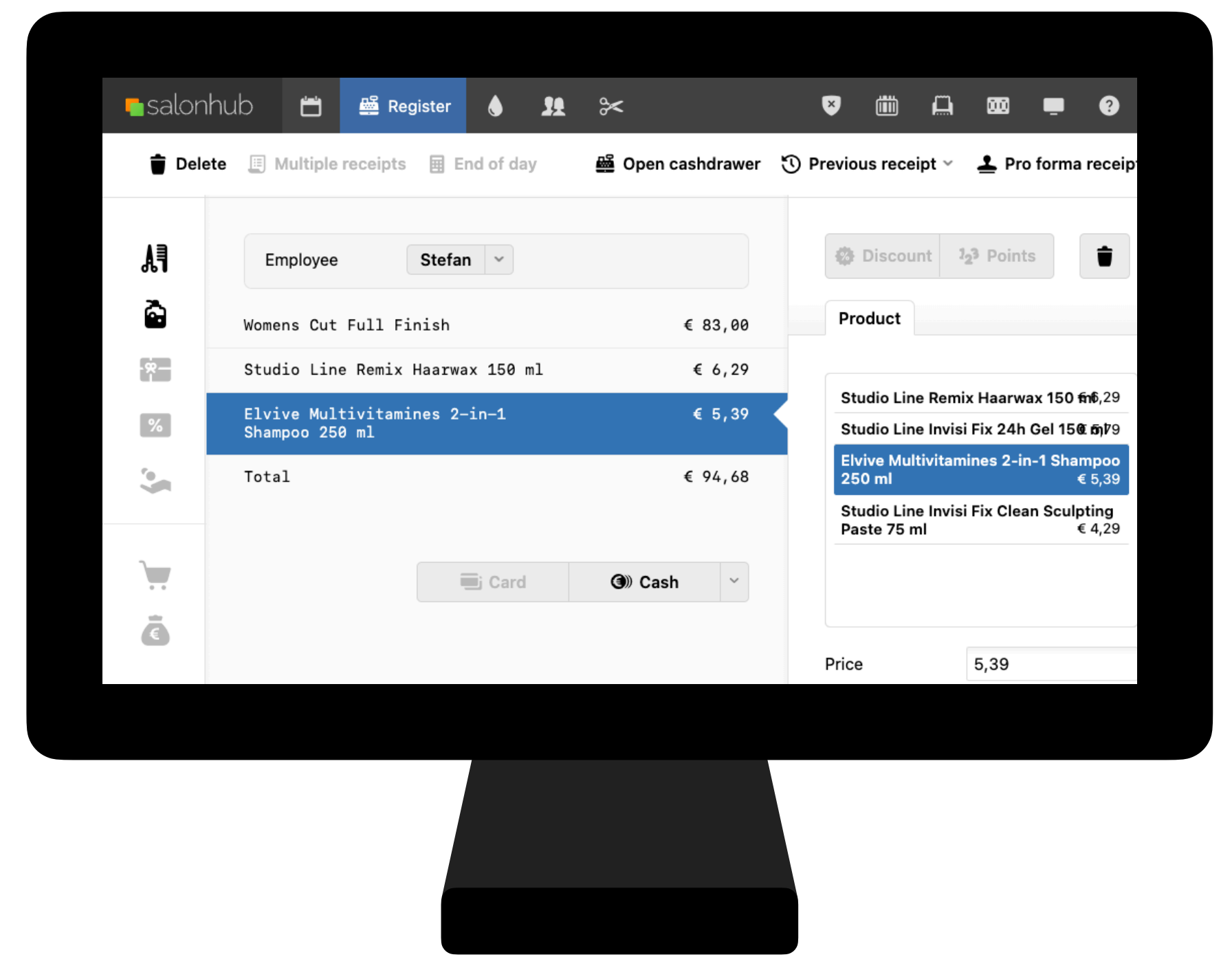
Product

| | |
|--|---------------|
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Studio Line Invisi Fix 24h Gel 150 ml | € 5,79 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Studio Line Invisi Fix Clean Sculpting Paste 75 ml | € 4,29 |

Price: 5,39

Amount: 1





Salonhub

salonhub.io/demo/

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| | |
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Card Cash

Product

| | |
|--|--------|
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Studio Line Invisi Fix 24h Gel 150 ml | € 5,79 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Studio Line Invisi Fix Clean Sculpting Paste 75 ml | € 4,29 |

Price: 5,39

Amount: 1

| | |
|---|----------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Total | € 94,68 |



```
/* Open a new browser window fullscreen on a specific screen */

function openFullscreen(label) {
  let screens = await window.getScreenDetails();
  let screen = displays.screens.find(screen => screen.label === label);

  let options =
    `width=${screen.width},height=${screen.height},` +
    `left=${screen.left},top=${screen.top},` +
    `fullscreen`;

  window.open("receipt-preview.html", "_blank", options);
}
```


How to get the data to the other window?

Salonhub

salonhub.io/demo/

Appointments Register Recipes Customers Team

Delete Multiple receipts End of day Open cashdrawer Previous receipt Pro forma receipt

Employee: Stefan

Discount Points

| | |
|---|----------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Total | € 94,68 |

Card Cash

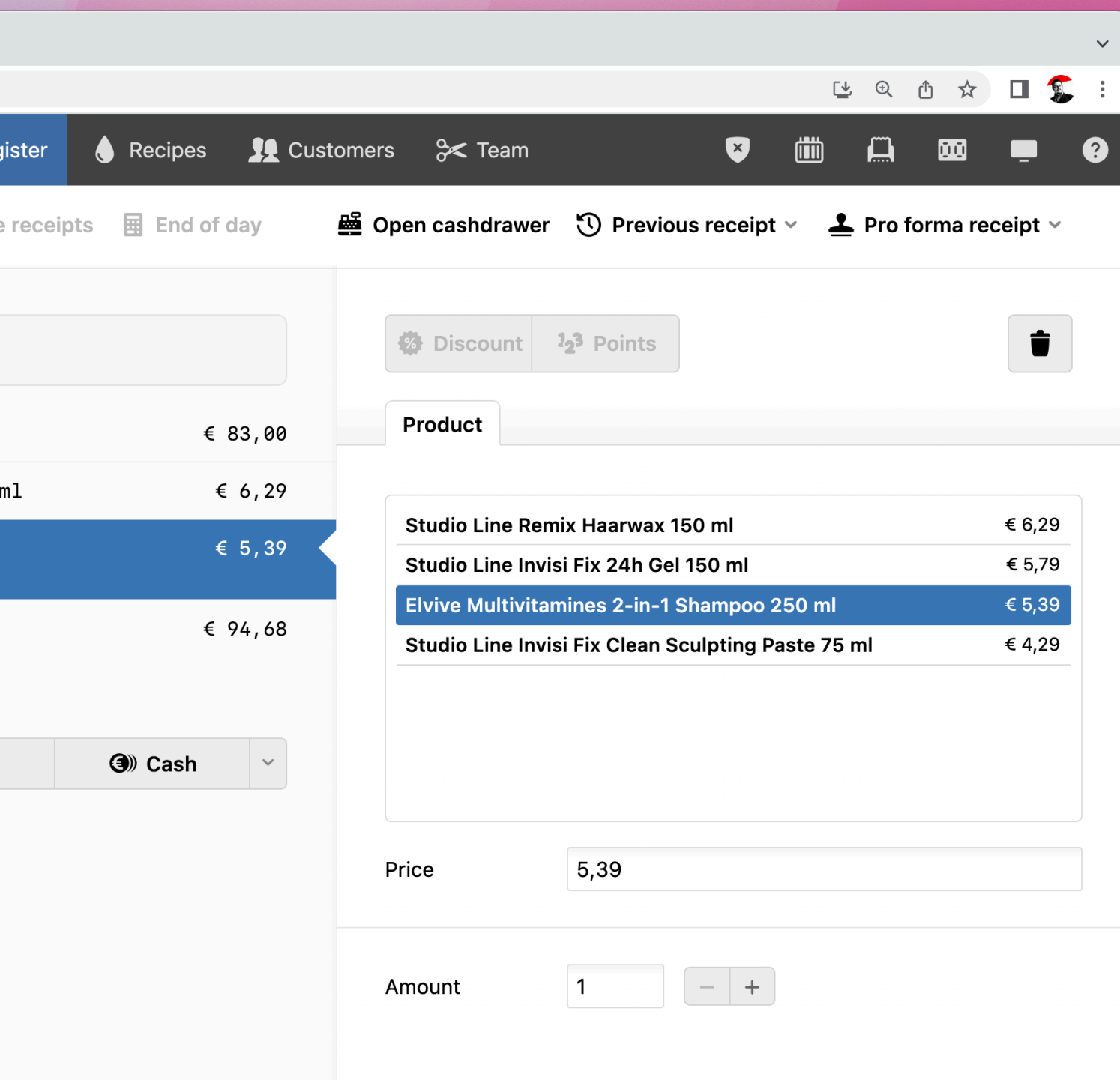
Product

| | |
|--|---------------|
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Studio Line Invisi Fix 24h Gel 150 ml | € 5,79 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Studio Line Invisi Fix Clean Sculpting Paste 75 ml | € 4,29 |

Price: 5,39

Amount: 1

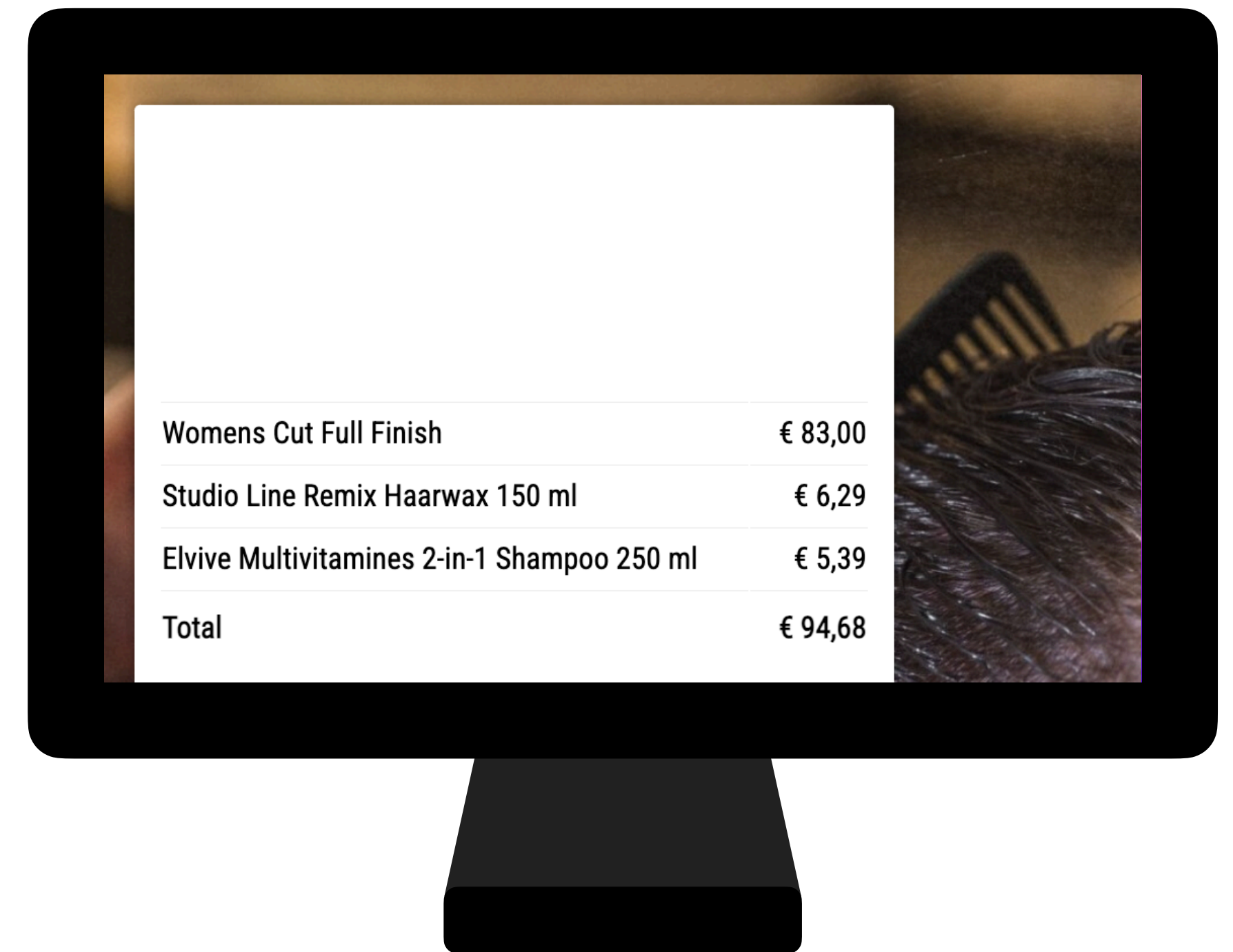
| | |
|---|----------------|
| Womens Cut Full Finish | € 83,00 |
| Studio Line Remix Haarwax 150 ml | € 6,29 |
| Elvive Multivitamines 2-in-1 Shampoo 250 ml | € 5,39 |
| Total | € 94,68 |



```
/* Send data in the main register window */
```

```
const channel = new BroadcastChannel('preview');  
channel.postMessage({  
  type: 'receipt',  
  data: data  
});
```

```
/* Listen in the receipt preview window */  
  
const channel = new BroadcastChannel('preview');  
channel.onmessage = (event) => {  
    handleMessage(event.data);  
}
```



Thank you!