Terminal vs. Explorer

- Schueler_Julia
  - datei1.txt
  - datei2.txt
schueler@schueler-Lenovo:~/$ cd Schueler_Julia/
schueler@schueler-Lenovo:~/$ ls
datei1.txt  datei2.txt
schueler@schueler-Lenovo:~/$ mkdir ordner2
schueler@schueler-Lenovo:~/$ ls
datei1.txt  datei2.txt  ordner2
schueler@schueler-Lenovo:~/$ 
Explorer
Explorer
Explorer
Explorer
Terminal vs. Explorer
Ergebnis

- Schueler_Julia
  - ordner2
    - datei1.txt
    - datei2.txt
Information und Daten

Information

Repräsentation  Abstraktion

Daten
Information und Daten

Repräsentation → Abstraktion → Repräsentation

Abstraktion → Repräsentation → Abstraktion
## Zahlensysteme

<table>
<thead>
<tr>
<th>Dezimal</th>
<th>Binär</th>
<th>Hexadezimal</th>
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# Zahlensysteme

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## Prefixe für Maßeinheiten

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Bezeichnung</th>
<th>Wert</th>
<th>Umgebung</th>
<th>Wert im Kilometer</th>
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</thead>
<tbody>
<tr>
<td>G</td>
<td>Giga &quot;Riese&quot;</td>
<td>$10^9$</td>
<td>Milliarde</td>
<td>$1.000.000$</td>
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<tr>
<td>M</td>
<td>Mega &quot;groß&quot;</td>
<td>$10^6$</td>
<td>Millionen</td>
<td>$1.000.000$</td>
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<tr>
<td>k</td>
<td>Kilo &quot;tausend&quot;</td>
<td>$10^3$</td>
<td>Tausend</td>
<td>$1.000$</td>
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<tr>
<td>m</td>
<td>Milli &quot;tausenstel&quot;</td>
<td>$10^{-3}$</td>
<td>Tausenstel</td>
<td>$0,001$</td>
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<tr>
<td>µ</td>
<td>Mikro &quot;klein&quot;</td>
<td>$10^{-6}$</td>
<td>Millionstel</td>
<td>$0.000.001$</td>
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<tr>
<td>n</td>
<td>Nano &quot;Zwerg&quot;</td>
<td>$10^{-9}$</td>
<td>Milliardstel</td>
<td>$0.000.000$</td>
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</tbody>
</table>

### Binäre Prefixe

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Bezeichnung</th>
<th>Wert</th>
<th>Umgebung</th>
<th>Wert im Kilometer</th>
</tr>
</thead>
<tbody>
<tr>
<td>GI</td>
<td>Gibi</td>
<td>$(2^{10})^3$</td>
<td>$2^{3^0}$</td>
<td>$1,074 \times 10^9$</td>
</tr>
<tr>
<td>MI</td>
<td>Mebi</td>
<td>$(2^{10})^2$</td>
<td>$2^{2^0} = 1048.576$</td>
<td>$1,048 \times 10^6$</td>
</tr>
<tr>
<td>KI</td>
<td>Kibi</td>
<td>$(2^{10})^{10}$</td>
<td>$2^{10} = 1024$</td>
<td>$1,024 \times 10^3$</td>
</tr>
</tbody>
</table>
Zahlensysteme - Dezimal

\[
\begin{align*}
123 &= 1 \cdot 10^2 + 2 \cdot 10^1 + 3 \cdot 10^0 \\
&= 123
\end{align*}
\]
Zahlensysteme - Binär

\[ \begin{array}{c}
2 & 1 & 0 \\
\hline
1 & 0 & 1 \\
\end{array} \]

\[ = 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0 \]

\[ = 1 \cdot 4 + 0 + 1 = 5 \]
Zahlensysteme - Hexadezimal

\[ \begin{align*}
\text{B95} &= B \cdot 16^2 + 9 \cdot 16^1 + 5 \cdot 16^0 \\
&= 11 \cdot 256 + 9 \cdot 16 + 5 \\
&= 2965
\end{align*} \]
Festplatte

Spur
Sektor
Block
Cluster
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<tr>
<th>Binary</th>
<th>Value</th>
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<tbody>
<tr>
<td>0000</td>
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<tr>
<td>0001</td>
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<td>1111</td>
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Rechnen mit negativen Binärzahlen

Um eine positive Zahl zu negieren, gilt folgende Rechenregel:

\[(0101)_2 = \text{NOT}(0101)_2 = (1010)_2 + (1)_2 = (1011)_2\]

\[(5)_{10} = \text{...............................................} = (-5)_{10}\]

So kann man auch Zahlen einfach addieren (zwischen -8 und +7)

\[(1110)_2 + (0101)_2 + (5)_{10} = (0011)_2 + (-2)_{10} + (5)_{10} = (3)_{10}\]
Darstellung von großen Zahlen und Gleitkommazahlen

\[ (-1)^v \cdot m \cdot 2^E \]

\( v \) ... Vorzeichen
\( m \) ... Mantisse
\( E \) ... Exponent

short real
Vorzeichen: 1 Bit
Exponent: 8 Bit
Mantisse: 23 Bit
Bias: 127
= 32 Bit

long real
Vorzeichen: 1 Bit
Exponent: 11 Bit
Mantisse: 52 Bit
Bias: 1023
= 64 Bit

\[ 1,0 \cdot 2^{-127} \approx 0 \]
\[ 1,0 \cdot 2^{127} \approx \infty \]
\[ -1,0 \cdot 2^{127} \approx -\infty \]
Darstellung von großen Zahlen und Gleitkommazahlen

32-Bit-Format

64-Bit-Format