Introduktion til Programmering og Problemløsning (PoP)

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Typer definerer formen på klodsen

Type:	int	float	char	string	float	float
Værdi:	3	3.0	'3'	"3"	3e0	3.0e0

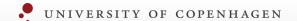
Metatype	Type name	Description
Boolean	<u>bool</u>	Boolean values true or false
Integer	<u>int</u>	Integer values from -2,147,483,648 to 2,147,483,647
	byte	Integer values from 0 to 255
	sbyte	Integer values from -128 to 127
	int8	Synonymous with sbyte
	uint8	Synonymous with byte
	int16	Integer values from -32768 to 32767
	uint16	Integer values from 0 to 65535
	int32	Synonymous with int
	uint32	Integer values from 0 to $4,294,967,295$
	int64	Integer values from $-9,223,372,036,854,775,808$ to
		9,223,372,036,854,775,807
	uint64	Integer values from 0 to 18,446,744,073,709,551,615
Real	<u>float</u>	64-bit IEEE 754 floating point value from $-\infty$ to ∞
	double	Synonymous with float
	single	A 32-bit floating point type
	float32	Synonymous with single
	decimal	A floating point data type that has at least 28
		significant digits
Character	<u>char</u>	Unicode character
	string	Unicode sequence of characters
None	<u>unit</u>	The value ()
Object	obj	An object
Exception	exn	An exception

Type	syntax	Examples	Value
int, int32	<int hex="" =""></int>	3, 0x3	3
	<int hex="" ="">l</int>	31, 0x31	
uint32	<int hex="" ="">u</int>	3u	3
	<int hex="" ="">ul</int>	3ul	
byte, uint8	<int hex="" ="">uy</int>	97uy	97
	' <char>'B</char>	'a'B	
byte[]	" <string>"B</string>	"a\n"B	[97uy; 10uy]
	@" <string>"B</string>	@"a\n"B	[97uy; 92uy; 110uy]
sbyte, int8	<int hex="" ="">y</int>	Зу	3
int16	<int hex="" ="">s</int>	3s	3
uint16	<int hex="" ="">us</int>	3us	3
int64	<int hex="" ="">L</int>	3L	3
uint64	<int hex="" ="">UL</int>	3UL	3
	<int hex="" ="">uL</int>	3uL	
float, double	<float></float>	3.0	3.0
	<hex>LF</hex>	0x013fLF	9.387247271e-323
single, float32	<float>F</float>	3.0F	3.0
	<float>f</float>	3.0f	3.0
	<hex>lf</hex>	0x013flf	4.4701421e-43f
decimal	<float int="" ="">M</float>	3.0M,3M	3.0
	<float int="" ="">m</float>	3.0m,3m	
string	" <string>"</string>	"\"quote\".\n"	"quote". <newline></newline>
	@" <string>"</string>	@"""quote"".\n"	$"$ quote". \setminus n.
	""" <string>"""</string>	""""quote".\n"""	$"$ quote". $\setminus n$

ASCII, Latin1, UTF8 og Kodesider

x0+0x	00	10	20	30	40	50	60	70
00	NUL	DLE	SP	0	@	P	4	p
01	SOH	DC1	!	1	A	Q	a	q
02	STX	DC2	"	2	В	R	b	r
03	ETX	DC3	#	3	C	S	c	s
04	EOT	DC4	\$	4	D	T	d	t
05	ENQ	NAK	%	5	E	U	e	u
06	ACK	SYN	&	6	F	V	f	v
07	BEL	ETB	,	7	G	W	g	w
08	BS	CAN	(8	Н	X	h	x
09	HT	EM)	9	I	Y	i	y
0A	LF	SUB	*	:	J	Z	j	Z
0B	VT	ESC	+	;	K	[k	{
0C	FF	FS	,	<	L	\	1	
0D	CR	GS	_	=	M]	m	}
0E	SO	RS	•	>	N	^	n	~
0F	SI	US	/	?	O	_	О	DEL

x0+0x	80	90	A0	В0	C0	D0	E0	F0
00			NBSP	0	À	Đ	à	ð
01			i	土	Á	Ñ	á	ñ
02			¢	2	Â	Ò	â	ò
03			£	3	Ã	Ó	ã	ó
04			¤	,	Ä	Ô	ä	ô
05			¥	μ	Å	Õ	å	õ
06				\P	Æ	Ö	æ	ö
07			§	•	Ç È	×	ç	÷
08			••	د		Ø	è	ø
09			©	1	É	Ù	é	ù
0a			<u>a</u>	Q	Ê	Ú	ê	ú
0b			«	*	Ë	Û	ë	û
0c				$\frac{1}{4}$	Ì	Ü	ì	ü
0d			SHY		Í	Ý	í	ý
0e			R	$\frac{\frac{1}{2}}{\frac{3}{4}}$	Î	Þ	î	þ
Of			_	i	Ϊ	ß	ï	ÿ



Tegn og Strenge

Character	Escape sequence	Description
BS	\b	Backspace
LF	\n	Line feed
CR	\r	Carriage return
HT	\t	Horizontal tabulation
\	\\	Backslash
"	\"	Quotation mark
,	\'	Apostrophe
BEL	\a	Bell
FF	\f	Form feed
VT	\v	Vertical tabulation
	\uXXXX, \UXXXXXXXX, \DDD	Unicode character

En char-type som repreræsenterer en ny linje: '\n' Eller som Unicode '\u000a'

En streng: "Hello World" En streng med:

Ny linje: "Hello World\n"

• Gåseøjne: "\"Hello World\""

• Verbatim: """Hello World"""

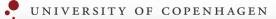
x0+0x	00	10	20	30	40	50	60	70
00	NUL	DLE	SP	0	@	P	4	p
01	SOH	DC1	!	1	A	Q	a	q
02	STX	DC2	"	2	В	R	b	r
03	ETX	DC3	#	3	С	S	c	S
04	EOT	DC4	\$	4	D	T	d	t
05	ENQ	NAK	%	5	E	U	e	u
06	ACK	SYN	&	6	F	V	f	v
07	BEL	ETB	,	7	G	W	g	w
08	BS	CAN	(8	Н	X	h	х
09	HT	EM)	9	I	Y	i	У
0A	LF	SUB	*	:	J	Z	j	Z
0B	VT	ESC	+	;	K	[k	{
0C	FF	FS	,	<	L	\	1	
0D	CR	GS	_	=	M]	m	}
0E	SO	RS		>	N	^	n	~
0F	SI	US	/	?	О	_	О	DEL



Operatorer, præcedens og association

Operatorer og typer

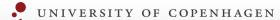
```
3 + 4
3.0 + 4.0
3 + 4.0
5 / 2
5 % 2
2 * (5 / 2) + 5 % 2
2.0 ** 3.0
pown 2 3
"hej " + "med " + "dig"
```



Operatorer, præcedens og association

Operatorer og typer	Præcendens og association
3 + 4	(2.0 + 3.0) + 4.0
3.0 + 4.0	(2.0 / 3.0 <mark>)</mark> / 4.0
<u>3 + 4.0</u>	2.0 **(3.0 ** 4.0)
5 / 2	(exp 0.0) + 1.0
5 % 2	
2 * (5 / 2) + 5 % 2	
2.0 ** 3.0	
pown 2 3	
"hej " + "med " + "dig"	

Operator	Associativity	Description
+ <expr>, -<expr>,</expr></expr>	Left	Unary identity, negation, and bitwise negation operator
~~~ <expr></expr>		
f <expr></expr>	Left	Function application
<expr> ** <expr></expr></expr>	Right	Exponent
<expr> * <expr>,</expr></expr>	Left	Multiplication, division and remainder
<expr> / <expr>,</expr></expr>		
<expr> % <expr></expr></expr>		
<expr> + <expr>,</expr></expr>	Left	Addition and subtraction binary operators
<expr> - <expr></expr></expr>		
<expr> ^^^ <expr></expr></expr>	Right	bitwise exclusive or
<expr> &lt; <expr>,</expr></expr>	Left	Comparison operators, bitwise shift, and bitwise 'and'
<expr> &lt;= <expr>,</expr></expr>		and 'or'.
<expr> &gt; <expr>,</expr></expr>		
<pre><expr> &gt;= <expr>,</expr></expr></pre>		
<pre><expr> = <expr>,</expr></expr></pre>		
<pre><expr> &lt;&gt; <expr>,</expr></expr></pre>		
<expr> &lt;&lt;&lt; <expr>,</expr></expr>		
<pre><expr> &gt;&gt;&gt; <expr>,</expr></expr></pre>		
<pre><expr> &amp;&amp;&amp; <expr>,</expr></expr></pre>		
<pre><expr>     <expr> ,</expr></expr></pre>		
<expr> &amp;&amp; <expr></expr></expr>	Left	Boolean and
<expr>    <expr></expr></expr>	Left	Boolean or



### String slicing, boolske værdier og sammenligning

Slicing	Boolske værdier og	Sammenligninger
Silcing	operatorer	Sammeningininger
$\frac{\text{"abcdefghijkl"}.[1]}{\text{ = 'b'}}$	true = 1	3 < 4
<u>"abcdefghijkl".[14]</u> = "bcde"	false = 0	3 > 4
<u>"abcdefghijkl".[4]</u> = "abcde"	a && b	3 <> 4
<u>"abcdefghijkl".[4]</u> = "efghijkl"	a    b	3 = 4
<u>"abcdefghijkl".Length</u> = 12	not a	not 3 = 4
<u>"abcdefghijkl".[011]</u> = "abcdefghijkl"		not (3 = 4)
3	h a lele h a	ll b not a

a	b	a && b	a    b	not a
false	false	false	false	true
false	true	false	true	true
true	false	false	true	false
true	true	true	true	false

#### Resumé

I denne video har du hørt om:

- Simple typer
- ASCII og UTF-8 tegnsæt
- Operatorer, association og præcedens
- Slicing af strenge