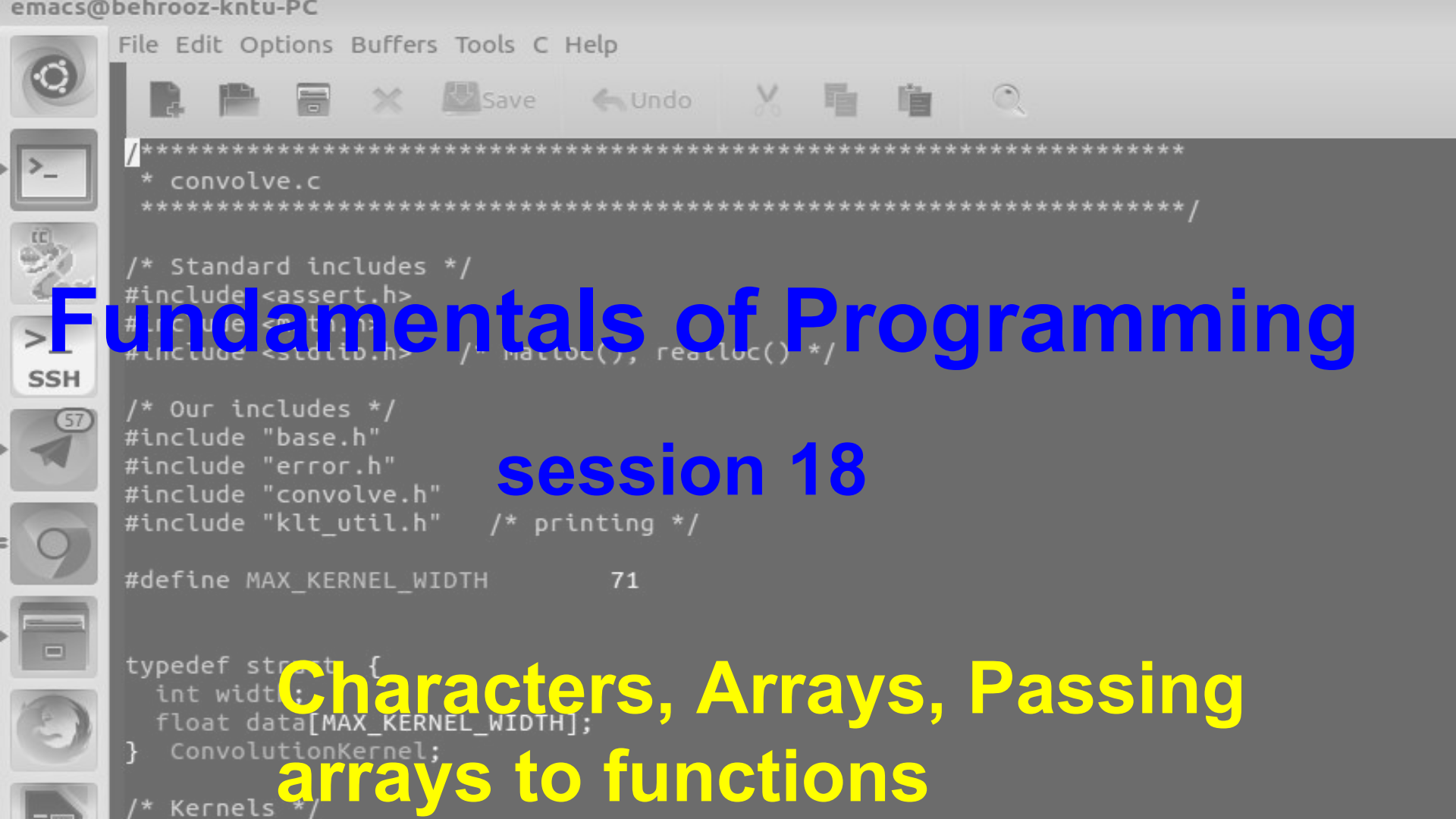

emacs@behrooz-kntu-PC
File Edit Options Buffers Tools C Help
Save
Undo
/* Standard includes */
/* Our includes */
#include "base.h"
#include "error.h"
#include "convolve.h"
#include "klt_util.h" /* printing */
#define MAX_KERNEL_WIDTH 71
typedef struct {
int width;
float data[MAX_KERNEL_WIDTH];
} ConvolutionKernel;
/* Kernels */
SSH
Fundamentals of Programming
session 18
Characters, Arrays, Passing arrays to functions

Midterm Exam

Bring Your Own Laptop!

Exercise

Write a program that prints the sum of the elements of an array.

```c
#include <stdio.h>

#define N 20

int main() {

  int a[N] = {1,3,4,5,6,1,2,3,4,5,6,7,8,1,3,1,4,4,19,20};
  int sum = 0;



  printf("sum=%d\n",sum);

  return 0;
}
```

Exercise

Write a program that prints the sum of the elements of an array.

```c
#include <stdio.h>

#define N 20

int main() {

  int a[N] = {1,3,4,5,6,1,2,3,4,5,6,7,8,1,3,1,4,4,19,20};
  int sum = 0;

  for (int i = 0; i < N; i++)
    sum += a[i];


  printf("sum=%d\n",sum);

  return 0;
}
```

sumarray.c

More on array definition

```
int a[12], b[13];
```

More on array definition

```
int a[12], b[13];
```

is the same as:

```
int a[12];
int b[13];
```

More on array definition

```
int a,b[13];
```

More on array definition

```
int a,b[12];
```

is the same as:

```
int a;
int b[12];
```

More on array definition

```
int a[] = {1,3,6,10};
```

More on array definition

```
int a[] = {1,3,6,10};
```

is the same as:

```
int a[4] = {1,3,6,10};
```

How to represent characters?

How to represent characters?

- BCD: Binary Coded Decimal
- EBCDIC: Extended Binary Coded Decimal Interchange Code
- ASCII: American Standard Code for Information Interchange
- Unicode (UTF-8, UTF-16, UTF-32, etc.)

ASCII Table

https://commons.wikimedia.org/wiki/File%3AAscii-proper-color.svg

Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char	Dec	Hex	Oct	Char
0	0	0		32	20	40	[space]	64	40	100	@	96	60	140	`
1	1	1		33	21	41	!	65	41	101	A	97	61	141	a
2	2	2		34	22	42	"	66	42	102	B	98	62	142	b
3	3	3		35	23	43	#	67	43	103	C	99	63	143	c
4	4	4		36	24	44	$	68	44	104	D	100	64	144	d
5	5	5		37	25	45	%	69	45	105	E	101	65	145	e
6	6	6		38	26	46	&	70	46	106	F	102	66	146	f
7	7	7		39	27	47	'	71	47	107	G	103	67	147	g
8	8	10		40	28	50	(	72	48	110	H	104	68	150	h
9	9	11		41	29	51	)	73	49	111	I	105	69	151	i
10	A	12		42	2A	52	*	74	4A	112	J	106	6A	152	j
11	B	13		43	2B	53	+	75	4B	113	K	107	6B	153	k
12	C	14		44	2C	54	,	76	4C	114	L	108	6C	154	l
13	D	15		45	2D	55	-	77	4D	115	M	109	6D	155	m
14	E	16		46	2E	56	.	78	4E	116	N	110	6E	156	n
15	F	17		47	2F	57	/	79	4F	117	O	111	6F	157	o
16	10	20		48	30	60	0	80	50	120	P	112	70	160	p
17	11	21		49	31	61	1	81	51	121	Q	113	71	161	q
18	12	22		50	32	62	2	82	52	122	R	114	72	162	r
19	13	23		51	33	63	3	83	53	123	S	115	73	163	s
20	14	24		52	34	64	4	84	54	124	T	116	74	164	t
21	15	25		53	35	65	5	85	55	125	U	117	75	165	u
22	16	26		54	36	66	6	86	56	126	V	118	76	166	v
23	17	27		55	37	67	7	87	57	127	W	119	77	167	w
24	18	30		56	38	70	8	88	58	130	X	120	78	170	x
25	19	31		57	39	71	9	89	59	131	Y	121	79	171	y
26	1A	32		58	3A	72	:	90	5A	132	Z	122	7A	172	z
27	1B	33		59	3B	73	;	91	5B	133	[	123	7B	173	{
28	1C	34		60	3C	74	<	92	5C	134	\	124	7C	174	|
29	1D	35		61	3D	75	=	93	5D	135	]	125	7D	175	}
30	1E	36		62	3E	76	>	94	5E	136	^	126	7E	176	~
31	1F	37		63	3F	77	?	95	5F	137	_	127	7F	177	

https://ascii.cl/

ASCII	Hex	Symbol
0	0	NUL
1	1	SOH
2	2	STX
3	3	ETX
4	4	EOT
5	5	ENQ
6	6	ACK
7	7	BEL
8	8	BS
9	9	TAB
10	A	LF
11	B	VT
12	C	FF
13	D	CR
14	E	SO
15	F	SI

ASCII	Hex	Symbol
16	10	DLE
17	11	DC1
18	12	DC2
19	13	DC3
20	14	DC4
21	15	NAK
22	16	SYN
23	17	ETB
24	18	CAN
25	19	EM
26	1A	SUB
27	1B	ESC
28	1C	FS
29	1D	GS
30	1E	RS
31	1F	US

ASCII	Hex	Symbol
32	20	(space)
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/

ASCII	Hex	Symbol
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?

ASCII	Hex	Symbol
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

ASCII	Hex	Symbol
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

ASCII	Hex	Symbol
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o

ASCII	Hex	Symbol
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	␡

https://ascii.cl/

ASCII	Hex	Symbol	ASCII	Hex	Symbol	ASCII	Hex	Symbol	ASCII	Hex	Symbol
0	0	NUL	16	10	DLE	32	20	(space)	48	30	0
1	1	SOH	17	11	DC1	33	21	!	49	31	1
2	2	STX	18	12	DC2	34	22	"	50	32	2
3	3	ETX	19	13	DC3	35	23	#	51	33	3
4	4	EOT	20	14	DC4	36	24	$	52	34	4
5	5	ENQ	21	15	NAK	37	25	%	53	35	5
6	6	ACK	22	16	SYN	38	26	&	54	36	6
7	7	BEL	23	17	ETB	39	27	'	55	37	7
8	8	BS	24	18	CAN	40	28	(	56	38	8
9	9	TAB	25	19	EM	41	29	)	57	39	9
10	A	LF	26	1A	SUB	42	2A	*	58	3A	:
11	B	VT	27	1B	ESC	43	2B	+	59	3B	;
12	C	FF	28	1C	FS	44	2C	,	60	3C	<
13	D	CR	29	1D	GS	45	2D	-	61	3D	=
14	E	SO	30	1E	RS	46	2E	.	62	3E	>
15	F	SI	31	1F	US	47	2F	/	63	3F	?

https://ascii.cl/

ASCII	Hex	Symbol
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

ASCII	Hex	Symbol
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

ASCII	Hex	Symbol
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o

ASCII	Hex	Symbol
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	⍝

putchar

```
NAME
       fputc, fputs, putc, putchar, puts - output of characters and strings

SYNOPSIS
       #include <stdio.h>

       int fputc(int c, FILE *stream);

       int fputs(const char *s, FILE *stream);

       int putc(int c, FILE *stream);

       int putchar(int c);

       int puts(const char *s);

DESCRIPTION
       fputc() writes the character c, cast to an unsigned char, to stream.

       fputs()  writes  the string s to stream, without its terminating null
       ('\0').

       putc() is equivalent to fputc() except that it may  be  implemented
       macro which evaluates stream more than once.

       putchar(c) is equivalent to putc(c, stdout).
```

putchar

ASCII	Hex	Symbol
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

ASCII	Hex	Symbol
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

ASCII	Hex	Symbol
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o

ASCII	Hex	Symbol
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	⌂

```c
#include <stdio.h>

int main() {
   putchar(65);

   return 0;
}
```

putchar.c

https://ascii.cl/

putchar

ASCII	Hex	Symbol
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

ASCII	Hex	Symbol
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

ASCII	Hex	Symbol
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o

ASCII	Hex	Symbol
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	⌂

```c
#include <stdio.h>

int main() {
   putchar(65);
   putchar(10);

   return 0;
}
```

putchar2.c

https://ascii.cl/

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char c = 65;

  for (int i = 0; i < 26; i++) {
    putchar(c);
    putchar(10);
    c++;
  }

  return 0;
}
```

putchar3.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char c = 65;

  char s[] = {83, 65, 76, 65, 77, 10};

  for (int i = 0; i < 6; i++) {
    putchar(s[i]);
  }

  return 0;
}
```

putchar4.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {

  printf("%d\n", 'A');

  return 0;
}
```

putchar5.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {

  printf("%d\n", 'A');

  return 0;
}
```

putchar5.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {

  printf("%d\n", 'A');

  return 0;
}
```

putchar5.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char j = 'A';

  for (int i = 0; i < 26; i++)
    putchar(j+i);

  putchar('\n');

  return 0;
}
```

putchar6.c

putchar

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  int n;

  char s[7] = {'S', 'a', 'l', 'a', 'm', '!', '\n'};

  for (int i = 0; i < 7; i++)
    putchar(s[i]);

  return 0;
}
```

putchar7.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char s[] = {'S', 'a', 'l', 'a', 'm', '!', '\n', 0};

  for (int i = 0; s[i] != 0; i++)
    putchar(s[i]);

  return 0;
}
```

putchar8.c

Different between 0 and '0'

ASCII	Hex	Symbol	ASCII	Hex	Symbol
32	20	(space)	48	30	0
33	21	!	49	31	1
34	22	"	50	32	2
35	23	#	51	33	3
36	24	$	52	34	4
37	25	%	53	35	5
38	26	&	54	36	6
39	27	'	55	37	7
40	28	(	56	38	8
41	29	)	57	39	9
42	2A	*	58	3A	:
43	2B	+	59	3B	;
44	2C	,	60	3C	<
45	2D	-	61	3D	=
46	2E	.	62	3E	>
47	2F	/	63	3F	?

https://ascii.cl/

```c
#include <stdio.h>

int main() {

  printf("%d, %d, %d\n", 0, '0', '\0');

  return 0;
}
```

putchar9.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  int n;

  char s[7] = {'S', 'a', 'l', 'a', 'm', '!', '\n'};

  for (int i = 0; i < 7; i++)
    putchar(s[i]);

  return 0;
}
```

putchar8.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char s[] = {'S', 'a', 'l', 'a', 'm', '!', '\n

  printf(s);

  return 0;
}
```

putchar10.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char s[] = {'S', 'a', 'l', 'a', 'm', '!', '\n',

  printf("%s", s);

  return 0;
}
```

putchar11.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char s1[] = {'S', 'a', 'l', 'a', 'm', '!', '\n', 0};
  char s2[] = "Salam!\n";

  printf("%s",s1);
  printf("%s",s2);


  return 0;
}
```

putchar12.c

Introduction to strings

ASCII	Hex	Symbol	ASCII	Hex	Symbol
64	40	@	80	50	P
65	41	A	81	51	Q
66	42	B	82	52	R
67	43	C	83	53	S
68	44	D	84	54	T
69	45	E	85	55	U
70	46	F	86	56	V
71	47	G	87	57	W
72	48	H	88	58	X
73	49	I	89	59	Y
74	4A	J	90	5A	Z
75	4B	K	91	5B	[
76	4C	L	92	5C	\
77	4D	M	93	5D	]
78	4E	N	94	5E	^
79	4F	O	95	5F	_

https://ascii.cl/

```c
#include <stdio.h>

int main() {
  char s[] = "Miam Barata! Kako!!!";
  int i = 0;

  while (s[i] != 0)
    i++;

  printf("%d\n", i);

  return 0;
}
```

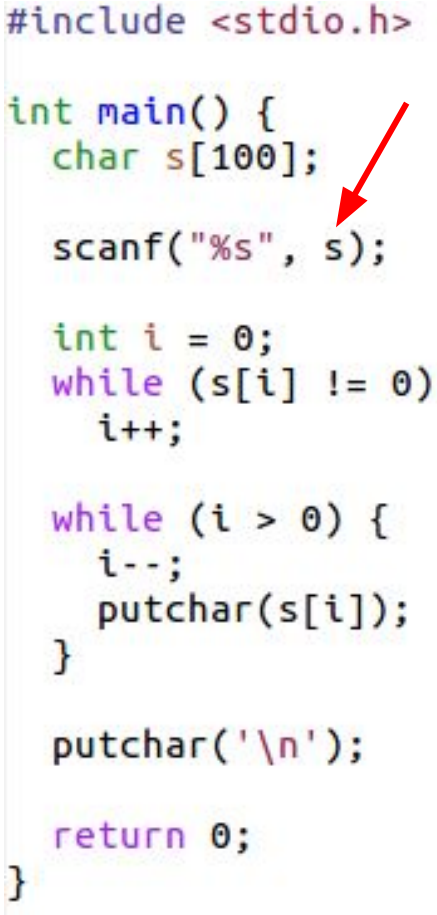
string1.c

Reading strings

```c
#include <stdio.h>

int main() {
  char s[100];

  scanf("%s", s);

  int i = 0;
  while (s[i] != 0)
    i++;

  while (i > 0) {
    i--;
    putchar(s[i]);
  }

  putchar('\n');

  return 0;
}
```

string2.c

Reading strings



```c
#include <stdio.h>

int main() {
  char s[100];

  scanf("%s", s);

  int i = 0;
  while (s[i] != 0)
    i++;

  while (i > 0) {
    i--;
    putchar(s[i]);
  }

  putchar('\n');

  return 0;
}
```

string2.c

Passing arrays to functions

```c
#include <stdio.h>

void myPuts(char[]);

int main() {
  char s[100] = "Salam Kako!!";

  myPuts(s);

  return 0;
}

void myPuts(char s[]) {

  for (int i = 0; s[i] != '\0'; i++)
    putchar(s[i]);

  putchar('\n');

}
```

arrayfunc.c

Changing array elements inside function

```c
#include <stdio.h>

void printArray(int[], int);
void changeArray(int[]);

int main() {
  int a[] = {1,2,3,4,5,6};

  printArray(a, 6);

  changeArray(a);

  printArray(a, 6);

  return 0;
}

void changeArray(int a[]) {
  a[0] = 8;
}

void printArray(int a[], int n) {
  for (int i = 0; i < n; i++)
    printf("%d, ", a[i]);
  putchar('\n');
}
```

arrayfunc3.c

const

```c
#include <stdio.h>


int main() {
  const int a = 10;

  a += 10;

}
```

const.c

const

```c
#include <stdio.h>


int main() {
  const int a = 10;

  a += 10;

}
```

```
behrooz:code$ gcc const.c
const.c: In function ‘main’:
const.c:7:5: error: assignment of read-only variable ‘a’
   a += 10;
     ^
```

const.c

const for arrays (principle of least privilage)

```c
#include <stdio.h>

void printArray(const int[], int);
void changeArray(int[]);

int main() {
  int a[] = {1,2,3,4,5,6};

  printArray(a, 6);

  changeArray(a);

  printArray(a, 6);

  return 0;
}

void changeArray(int a[]) {
  a[0] = 8;
}

void printArray(const int a[], int n) {
  for (int i = 0; i < n; i++)
    printf("%d, ", a[i]);
  putchar('\n');
}
```

arrayfunc4.c

const for arrays (principle of least privilage)

```c
#include <stdio.h>

void printArray(const int[], int);
void changeArray(const int[]);

int main() {
  int a[] = {1,2,3,4,5,6};

  printArray(a, 6);

  changeArray(a);

  printArray(a, 6);

  return 0;
}

void changeArray(const int a[]) {
  a[0] = 8;
}

void printArray(const int a[], int n) {
  for (int i = 0; i < n; i++)
    printf("%d, ", a[i]);
  putchar('\n');
}
```

arrayfunc5.c

const for arrays (principle of least privilage)

```c
#include <stdio.h>

void printArray(const int[], int);
void changeArray(const int[]);

int main() {
  int a[] = {1,2,3,4,5,6};

  printArray(a, 6);

  changeArray(a);

  printArray(a, 6);

  return 0;
}

void changeArray(const int a[]) {
  a[0] = 8;
}

void printArray(const int a[], int n) {
  for (int i = 0; i < n; i++)
    printf("%d, ", a[i]);
  putchar('\n');
}
```

arrayfunc5.c

const for arrays (principle of least privilage)

```c
#include <stdio.h>

void printArray(const int[], int);
void changeArray(const int[]);

int main() {
  int a[] = {1,2,3,4,5,6};

  printArray(a, 6);

  changeArray(a);

  printArray(a, 6);

  return 0;
}

void changeArray(const int a[]) {
  a[0] = 8;
}

void printArray(const int a[], int n) {
  for (int i = 0; i < n; i++)
    printf("%d, ", a[i]);
  putchar('\n');
}
```

```
behrooz:code$ gcc arrayfunc5.c
arrayfunc5.c: In function ‘changeArray’:
arrayfunc5.c:19:8: error: assignment of read-only location ‘*a’
   a[0] = 8;
        ^
```

arrayfunc5.c

Sorting Arrays

```
#define SIZE  11

int array[11] = {25, 19, 14, 17, 27,  6, 18, 20,  1, 21, 32};
```

25	19	14	18	27	6	18	20	1	21	32

Sorting Arrays

```
#define SIZE  11

int array[11] = {25, 19, 14, 17, 27,  6, 18, 20,  1, 21, 32};
```

25	19	14	18	27	6	18	20	1	21	32

1	6	14	18	18	19	20	21	25	27	32