

BTH001 Object Oriented Programming Lesson 04 Dynamic memory allocation



Different parts of memory

The primary memory is divided into two main parts:

- One part for which memory is allocated **statically**. This is done by the compiler . Memory is reserved for variables and functions.
- One part that is used for allocation of memory during execution, e.g. used for dynamic memory allocation.



in	ı real life	Static	part of memory	 	Dynamic part o	f memory
101				501	513	3
102				502	514	1
103	12		value	503	515	5
104	nullptr		nrs	504	516	8
105	0		arr	505	517	7
106	0			506	518	3
107	0		int main()	507	519	9
108			│{ │	508	520	
109			int *nrs = nullp		52′	
110			int arr[3] = {0,		522	2
111			11	511	523	3
112			//	512	524	1
			return 0;			



	real life	Static	part of memory	 	Dynami	c part of memo	ry
101				501	0	513	
102				502	0	514	
103	12		value	503	0	515	
104	501		nrs	504	0	516	
105	0		arr	505		517	
106	0			506		518	
107	0		int main()	507		519	
108			{	508		520	
109			int value = 12 int *nrs = nullp	/ / \ / \ \		521	
110			int arr[3] = {0,			522	
111			nrs = new int[4]{0};		523	
112				512		524	
			return 0;				



in	real life	Static	part of memory	 	Dynamic p	art of memory
101				501	0	513
102				502	33	514
103	12		value	503	0	515
104	501		nrs	504	0	516
105	0		arr	505		517
106	0			506		518
107	0		int main()	507		519
108			{ int value = 12	508		520
109			int value = 12	/_ / \ \ \ \		521
110			int arr[3] = {0,			522
111			nrs = new int[4	4]{0};		523
112			nrs[1] = 33;	512		524
			return 0;			



	BTH • 1	Static _l	part of memory	 	Dynamic p	part of memory
101				501	0	513
102				502	33	514
103	12		value	503	0	515
104	501		nrs	504	0	516
105	0		arr	505		517
106	0			506		518
107	0		int main()	507		519
108			{ int value = 12	508		520
109			int value = 12 int *nrs = null	/_ / \ / \ \		521
110			int $arr[3] = \{0,$	0, 0};0		522
111			nrs = new int[4	4]{0}; ₁		523
112			nrs[1] = 33; delete [] nrs;	512		524
			return 0;			



More static allocation

Assume the class type Book

```
Book aBook("C++", "Gaddis", 125.0);
Book *bookPtr = nullptr;
```



Static	part	of	me	mor	y
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Dynamic	part of	memory
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101		
102		
103	"C++"	aBook
104	"Gaddis"	
105	125.0	
106	nullptr	bookPtr
107		
108		
109		
110		
111		
112		

501	513	
502	514	
503	515	
504	516	
505	517	
506	518	
507	519	
508	520	
509	521	
510	522	
511	523	
512	524	



Dynamic allocation

```
Book aBook("C++", "Gaddis", 125.0);
Book *bookPtr = nullptr;
```

bookPtr = new Book("Java", "Savitch", 120.0);



Static part of memory

Dynamic part of memory

•••	
•••	
"C++"	aBook
"Gaddis"	
125.0	
501	bookPtr
	"Gaddis" 125.0

501	"Java"	513	
502	"Savitch"	514	
503	120.0	515	
504		516	
505		517	
506		518	
507		519	
508		520	
509		521	
510		522	
511		523	
512		524	



dot or arrow

```
Book aBook("C++", "Gaddis", 125.0);

Book *bookPtr = nullptr;

bookPtr = new Book("Java", "Savitch", 120.0);

aBook.setTitle("OO C++"); // use .

bookPtr->setTitle("Java 2"); // use ->
```



Static part of memory

Dynamic pa	art of memory
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101		
102	•••	
103	"OO C++"	aBook
104	"Gaddis"	
105	125.0	
106	501	bookPtr
107		
108		
109		
110		
111		
112		

		_
501	"Java 2"	513
502	"Savitch"	514
503	120.0	515
504		516
505		517
506		518
507		519
508		520
509		521
510		522
511		523
512		524



Dereferencing pointer

```
Book aBook("C++", "Gaddis", 125.0);
Book *bookPtr = nullptr;
bookPtr = new Book("Java", "Savitch", 120.0);
aBook.setTitle("OO C++"); // use .
bookPtr->setTitle("Java 2"); // use ->
(*bookPtr).changePrice(10); // dereferencing
```



Static part of me	mory
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Dynamic	nart	$\sim f$	mamoru
Dynamic	μαιι	OI	III C IIIOI y

101		
102	•••	
103	"OO C++"	aBook
104	"Gaddis"	
105	125.0	
106	501	bookPtr
107		
108		
109		
110		
111		
112		

501	"Java 2"	513
502	"Savitch"	514
503	132.0	515
504		516
505		517
506		518
507		519
508		520
509		521
510		522
511		523
512		524



deallocating

```
Book aBook("C++", "Gaddis", 125.0);

Book *bookPtr = nullptr;

bookPtr = new Book("Java", "Savitch", 120.0);

aBook.setTitle("OO C++"); // use .

bookPtr->setTitle("Java 2"); // use ->
```

(*bookPtr).changePrice(10); // dereferencing delete bookPtr; // call of destructor



Statio part of morning	Static	part	of	me	mory
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Dynamic	part o	of memory
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101		
102	•••	
103	"OO C++"	aBook
104	"Gaddis"	
105	125.0	
106	501	bookPtr
107		
108		
109		
110		
111		
112		

501	513	
502	514	
503	515	
504	516	
505	517	
506	518	
507	519	
508	520	
509	521	
510	522	
511	523	
512	524	