# FURTHER HAND-TRANSLATION HINTS

**Q.** What code should be generated for the following expression?

`new int [<expr>] [] ... []`

e.g., `new int [2*x+1][][][]`

**ANSWER:**

code that leaves value of <expr> on top of EXPRSTACK

**HEAPALLOC**

**Example** Suppose a is declared as **static int** a[]; and the data memory address of a is 5.

What TinyJ VM instructions should

```
a = new int[100];
```

be translated to?

**ANSWER:**

```
PUSHSTATADDR 5
    ⋮

SAVETOADDR
```

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new int [<expr>] [] ... []
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**HEAPALLOC**

**Example** Suppose a is declared as **static int** a[]; and the data memory address of a is 5.

What TinyJ VM instructions should

```
a = new int[100];
```

be translated to?

**ANSWER:**

```
PUSHSTATADDR 5
PUSHNUM 100
HEAPALLOC
SAVETOADDR
```

## *BEFORE execution of*: PUSHSTATADDR 5

| address | Statically Allocated Data Memory |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| a 5 | |

| address | HEAP (Part of Data memory) |
|---|---|
| ⋮ | already allocated for other purposes |
| 13212 | |

| address | CODE MEMORY |
|---|---|
| 0 | PUSHSTATADDR 5 |
| 1 | PUSHNUM 100 |
| ⋮ | HEAPALLOC |
| | SAVETOADDR |
| | These instructions execute: |
| | a = new int[100]; |

| EXPRSTACK |
|---|
| ??? |
| ⋮ |
| ??? |

## *AFTER execution of*: PUSHSTATADDR 5

| address | Statically Allocated Data Memory |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| a 5 | ———————— |
| | ———————— |

| EXPRSTACK |
|---|
| ??? |
| ⋮ |
| ??? |
| PTR TO ADDR 5 |

| address | HEAP (Part of Data memory) |
|---|---|
| ⋮ | already allocated for other purposes |
| 13212 | |

| address | CODE MEMORY |
|---|---|
| 0 | |
| 1 | |
| ⋮ | |
| | PUSHSTATADDR 5 |
| | PUSHNUM 100 |
| | HEAPALLOC |
| | SAVETOADDR |
| | These instructions execute: |
| | a = new int[100]; |

## *AFTER execution of:* PUSHNUM 100

| address | Statically Allocated Data Memory |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| a 5 | |

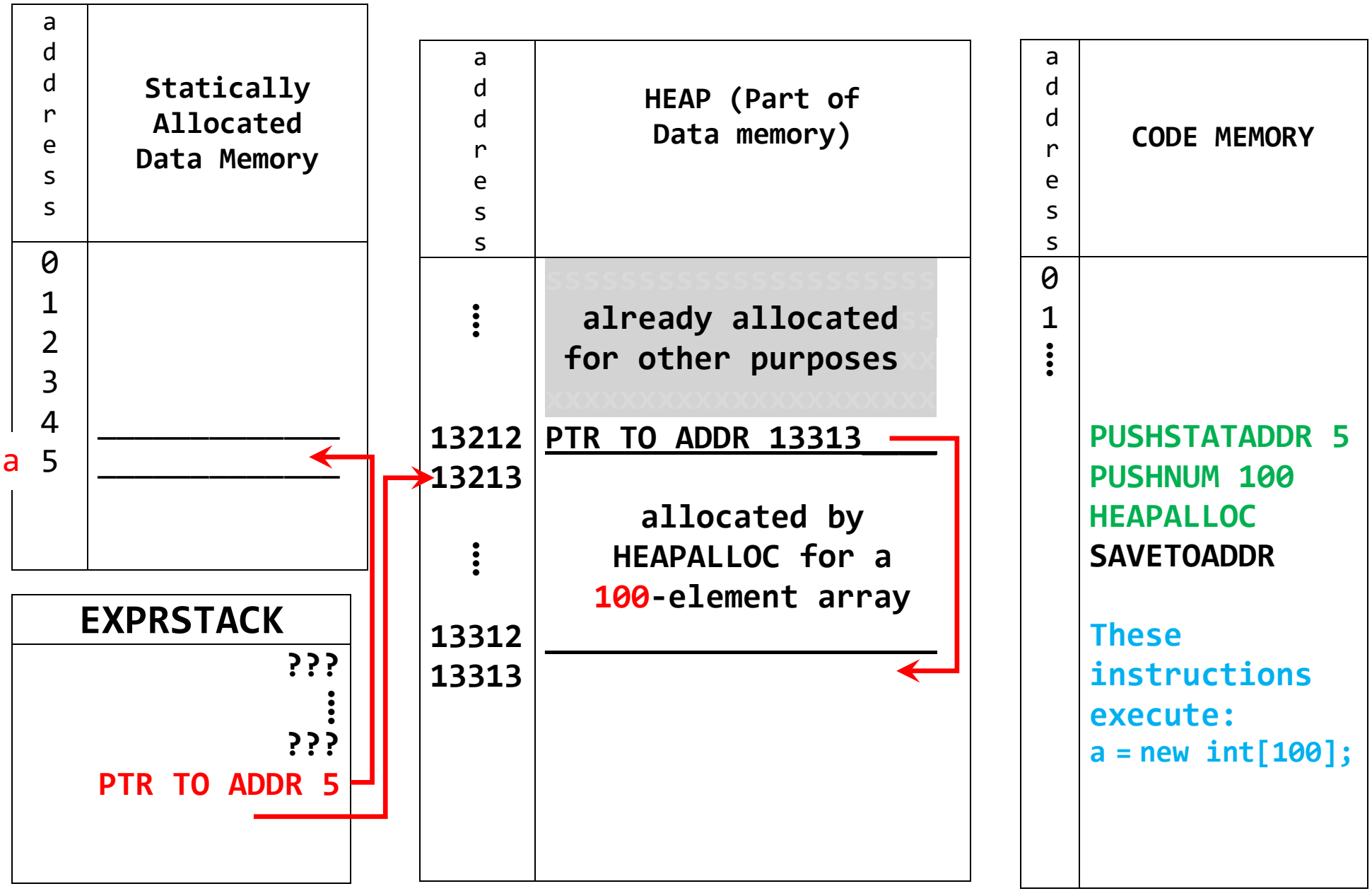
**EXPRSTACK**

???
⋮
???
PTR TO ADDR 5
100

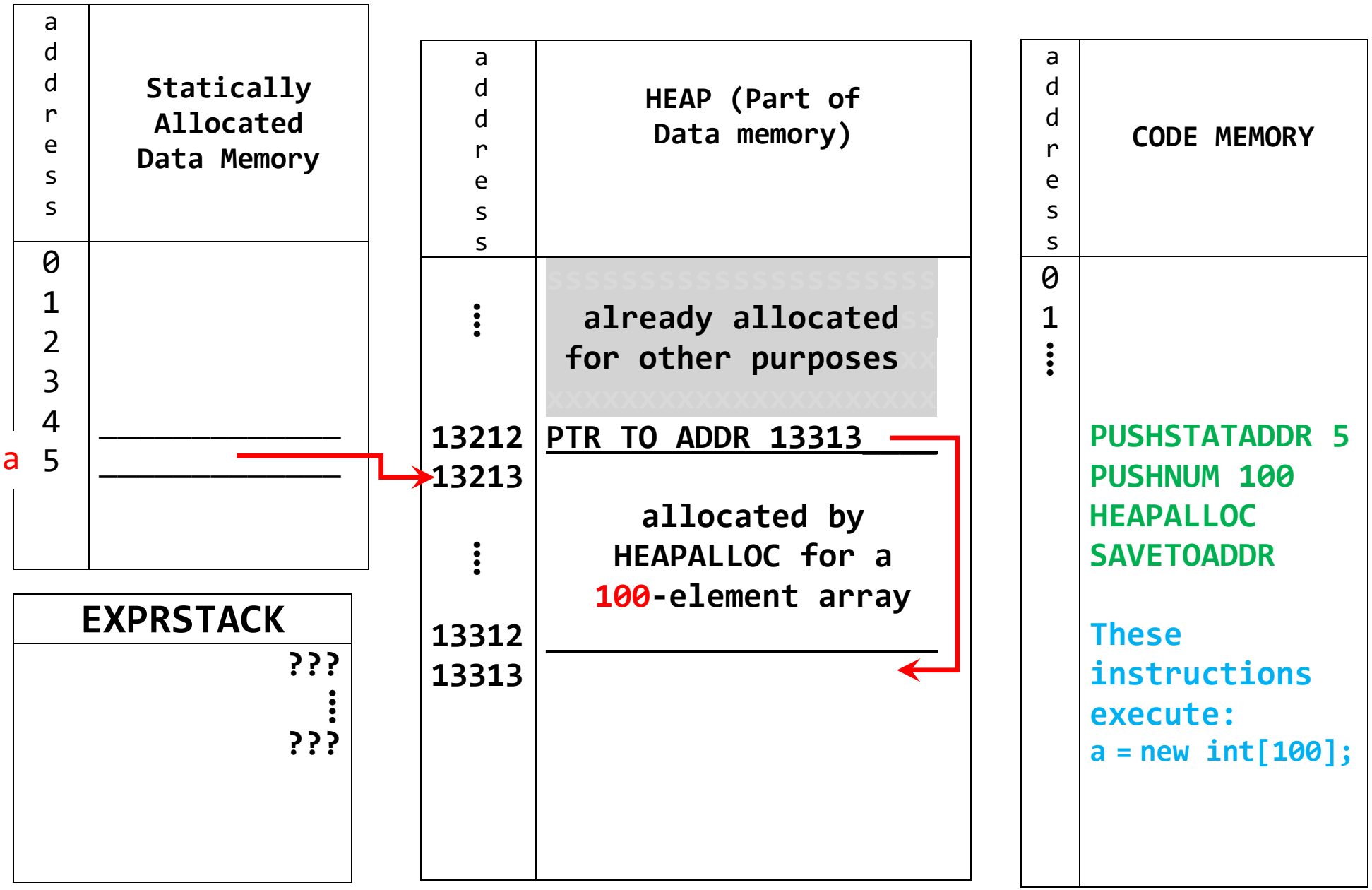
| address | HEAP (Part of Data memory) |
|---|---|
| ⋮ | already allocated for other purposes |
| 13212 | |

| address | CODE MEMORY |
|---|---|
| 0 | |
| 1 | |
| ⋮ | |
| | PUSHSTATADDR 5 |
| | PUSHNUM 100 |
| | HEAPALLOC |
| | SAVETOADDR |
| | These instructions execute: |
| | a = new int[100]; |

# *AFTER execution of:* HEAPALLOC



## *AFTER execution of:* SAVETOADDR



# *AFTER execution of:* SAVETOADDR

| address | Statically Allocated Data Memory |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| a 5 | |

**EXPRSTACK**

???
⋮
???

| address | HEAP (Part of Data memory) |
|---|---|
| ⋮ | already allocated for other purposes |
| 13212 | PTR TO ADDR 13313 |
| 13213 | this is a[0]'s location |
| | this is a[1]'s location |
| ⋮ | ⋮ |
| | this is a[98]'s location |
| 13312 | this is a[99]'s location |
| 13313 | |

| address | CODE MEMORY |
|---|---|
| 0 | PUSHSTATADDR 5 |
| 1 | PUSHNUM 100 |
| ⋮ | HEAPALLOC |
| | SAVETOADDR |
| | These instructions execute: |
| | a = new int[100]; |