PREGUNTA 2

ALCANCE ESTÁTICO Y ASOCIACIÓN PROFUNDA

X = 4, Y = 9, Z = 0

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

Global			
	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

→ | y | G |

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	1	waitwhat	ohno G
	0	y	5
		PC	4

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	6	waitwhat	ohno G
	5	y	25
		PC	8
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
▸  0 int x = 5, y = 9

▸  1 proc ohno(int x) {
▸  2     y := 2 * x;
     }

▸  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
▸  4        proc ohno(int x) {
▸  5            x := y * 2;
           }
▸  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
▸  7        ohwell(y + 10, ohno);
        } else {
▸  8        int x = 0;
▸  9        waitwhat(x + y);
        }
▸ 10     print(x, y)
     }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

>

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	9
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

| ohno | 8 | x | 25 |
| | | PC | 2 |

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	9

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
▸  0 int x = 5, y = 9

▸  1 proc ohno(int x) {
▸  2     y := 2 * x;
     }

▸  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
▸  4        proc ohno(int x) {
▸  5            x := y * 2;
           }
▸  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
▸  7        ohwell(y + 10, ohno);
        } else {
▸  8        int x = 0;
▸  9        waitwhat(x + y);
        }
▸ 10     print(x, y)
     }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

```
> (5,25)
```

| ohno | 8 | x | 25 |
| | | PC | 2 |

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (5,25) (5,15)

ohno	8	x	25
		PC	2

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

```
▸ 0  int x = 5, y = 9

▸ 1  proc ohno(int x) {
▸ 2      y := 2 * x;
     }

▸ 3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
▸ 4          proc ohno(int x) {
▸ 5              x := y * 2;
             }
▸ 6          ohwell(y + 10, waitwhat);
         } else if (y < 20) {
▸ 7          ohwell(y + 10, ohno);
         } else {
▸ 8          int x = 0;
▸ 9          waitwhat(x + y);
         }
▸ 10     print(x, y)
     }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

> (5,25) (5,15) (5,5)

ohno	8	x	25
		PC	2

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (5,25) (5,15) (5,5) (5,50)

ALCANCE DINÁMICO Y ASOCIACIÓN PROFUNDA

$X = 4, Y = 9, Z = 0$

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2     y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣  4         proc ohno(int x) {
‣  5             x := y * 2;
             }
‣  6         ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣  7         ohwell(y + 10, ohno);
         } else {
‣  8         int x = 0;
‣  9         waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
	PC	11	

→ | y | G |

```
‣  0  int x = 5, y = 9

‣  1  proc ohno(int x) {
‣  2      y := 2 * x;
       }

‣  3  proc ohwell(int y, proc waitwhat) {
          if (y < 10) {
‣  4          proc ohno(int x) {
‣  5              x := y * 2;
              }
‣  6          ohwell(y + 10, waitwhat);
          } else if (y < 20) {
‣  7          ohwell(y + 10, ohno);
          } else {
‣  8          int x = 0;
‣  9          waitwhat(x + y);
          }
‣ 10      print(x, y)
       }

‣ 11  ohwell(x, ohno)
‣ 12  print(x, y)
```

IMPRIME

```
>
```

ohwell	1	waitwhat	ohno G
	0	y	5
		PC	4

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

→ | y | G |

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2     y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣  4         proc ohno(int x) {
‣  5             x := y * 2;
             }
‣  6         ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣  7         ohwell(y + 10, ohno);
         } else {
‣  8         int x = 0;
‣  9         waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2     y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
‣  4        proc ohno(int x) {
‣  5            x := y * 2;
            }
‣  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
‣  7        ohwell(y + 10, ohno);
        } else {
‣  8        int x = 0;
‣  9        waitwhat(x + y);
        }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

ohwell	6	waitwhat	ohno 2
	5	y	25
		PC	8

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc	→	y	3
	1	waitwhat	ohno G
	0	y	5
		PC	6

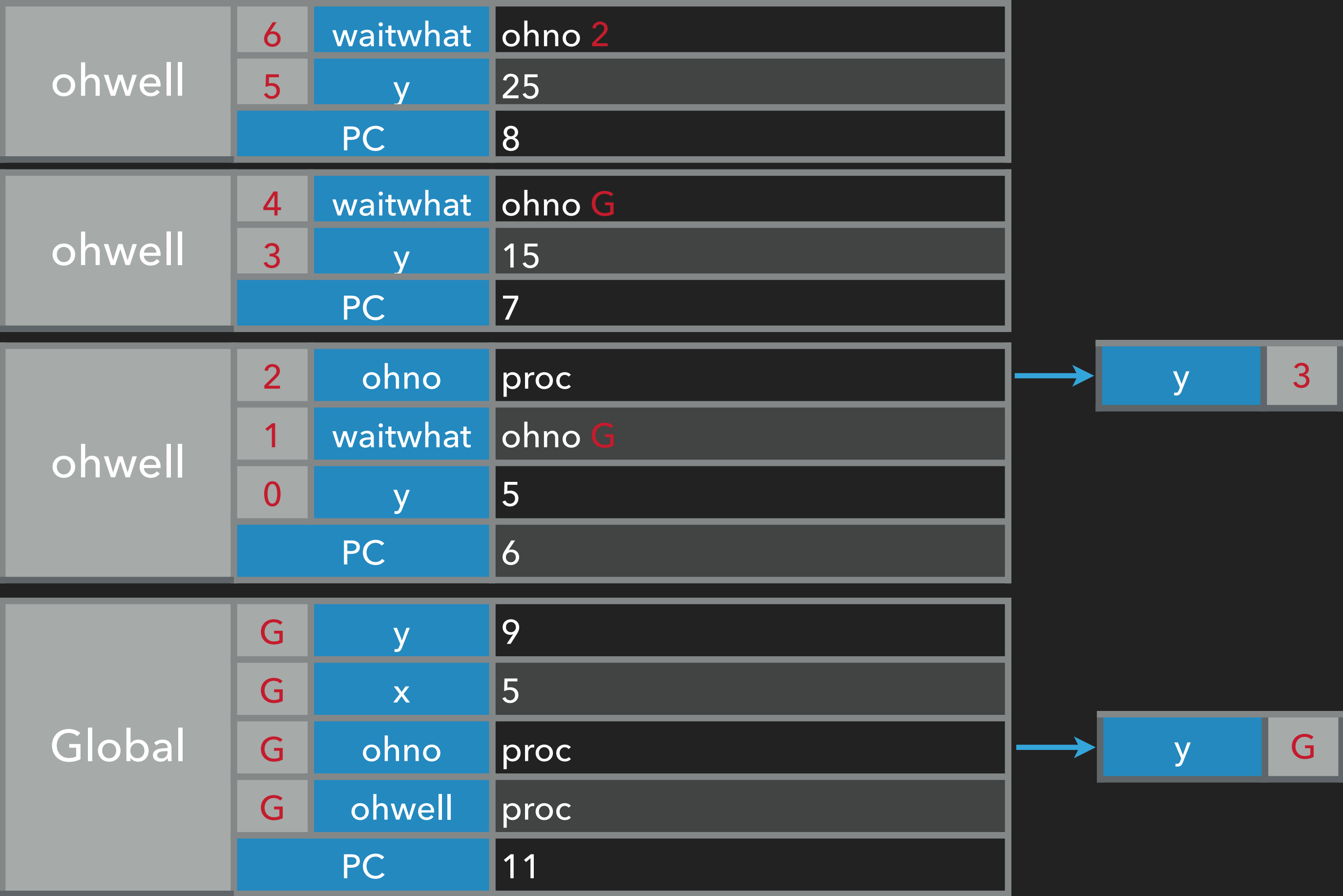| Global | G | y | 9 |
	G	x	5
	G	ohno	proc	→	y	G
	G	ohwell	proc
		PC	11

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	9
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc	→	y	3
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc	→	y	G
	G	ohwell	proc
		PC	11

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

| ohno | 8 | x | 25 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	9

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc → [y	3]
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc → [y	G]
	G	ohwell	proc
		PC	11

```
‣ 0  int x = 5, y = 9

‣ 1  proc ohno(int x) {
‣ 2      y := 2 * x;
     }

‣ 3  proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
‣ 4         proc ohno(int x) {
‣ 5             x := y * 2;
            }
‣ 6         ohwell(y + 10, waitwhat);
        } else if (y < 20) {
‣ 7         ohwell(y + 10, ohno);
        } else {
‣ 8         int x = 0;
‣ 9         waitwhat(x + y);
        }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

> (0,25)

| ohno | 8 | x | 30 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc	→	y	3
	1	waitwhat	ohno G
	0	y	5
		PC	6

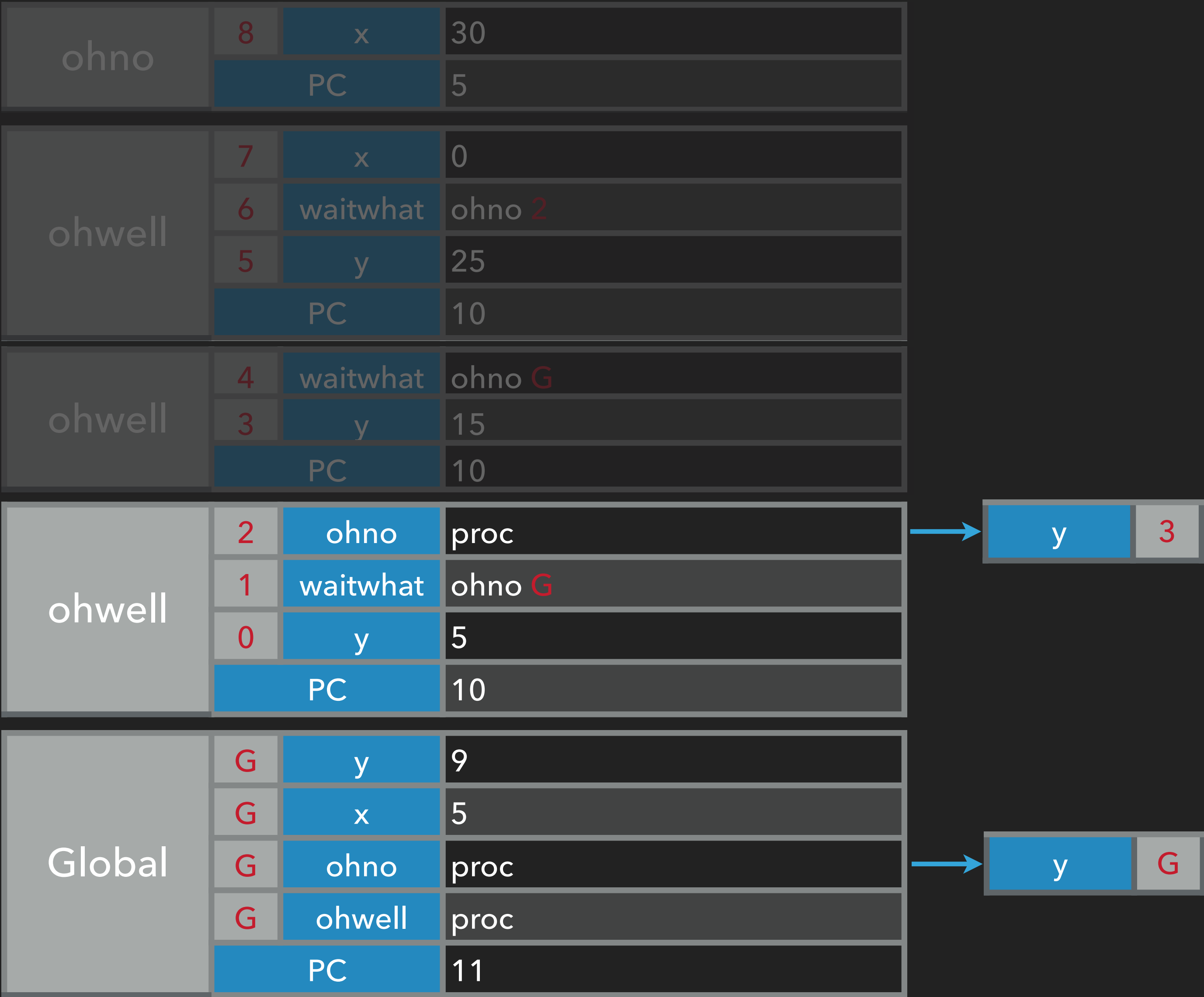| Global | G | y | 9 |
	G	x	5
	G	ohno	proc	→	y	G
	G	ohwell	proc
		PC	11

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

```
> (0,25) (5,15)
```

| ohno | 8 | x | 30 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc	→	y	3
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc	→	y	G
	G	ohwell	proc
		PC	11

```
‣  0  int x = 5, y = 9

‣  1  proc ohno(int x) {
‣  2      y := 2 * x;
       }

‣  3  proc ohwell(int y, proc waitwhat) {
          if (y < 10) {
‣  4          proc ohno(int x) {
‣  5              x := y * 2;
              }
‣  6          ohwell(y + 10, waitwhat);
          } else if (y < 20) {
‣  7          ohwell(y + 10, ohno);
          } else {
‣  8          int x = 0;
‣  9          waitwhat(x + y);
          }
‣ 10      print(x, y)
       }

‣ 11  ohwell(x, ohno)
‣ 12  print(x, y)
```

IMPRIME

```
> (0,25) (5,15) (5, 5)
```

| ohno | 8 | x | 30 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc	→	y	3
	1	waitwhat	ohno G
	0	y	5
		PC	10

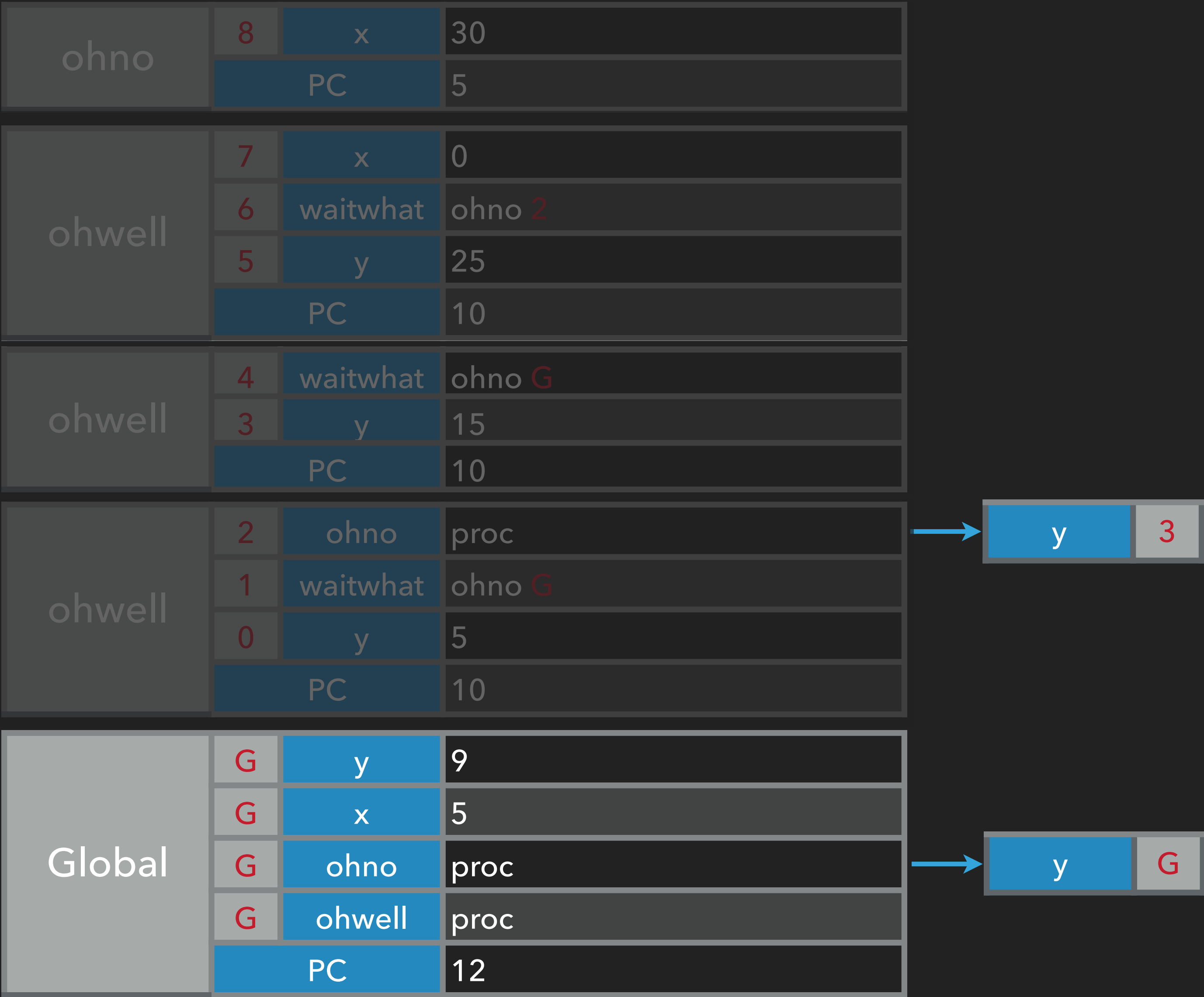| Global | G | y | 9 |
	G	x	5
	G	ohno	proc	→	y	G
	G	ohwell	proc
		PC	11

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (0,25) (5,15) (5,5) (5,9)

ohno	8	x	30
		PC	5

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

→ | y | 3 |

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	12

→ | y | G |

ALCANCE ESTÁTICO Y ASOCIACIÓN SUPERFICIAL

$X = 4, Y = 9, Z = 0$

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2     y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣  4         proc ohno(int x) {
‣  5             x := y * 2;
             }
‣  6         ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣  7         ohwell(y + 10, ohno);
         } else {
‣  8         int x = 0;
‣  9         waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
	PC		11

```
▸  0 int x = 5, y = 9

▸  1 proc ohno(int x) {
▸  2     y := 2 * x;
   }

▸  3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
▸  4         proc ohno(int x) {
▸  5             x := y * 2;
           }
▸  6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
▸  7         ohwell(y + 10, ohno);
       } else {
▸  8         int x = 0;
▸  9         waitwhat(x + y);
       }
▸ 10     print(x, y)
   }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

```
>
```

ohwell	1	waitwhat	ohno G
	0	y	5
		PC	4

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

```
>
```

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣ 0  int x = 5, y = 9

‣ 1  proc ohno(int x) {
‣ 2      y := 2 * x;
     }

‣ 3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣ 4          proc ohno(int x) {
‣ 5              x := y * 2;
             }
‣ 6          ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣ 7          ohwell(y + 10, ohno);
         } else {
‣ 8          int x = 0;
‣ 9          waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣  0  int x = 5, y = 9

‣  1  proc ohno(int x) {
‣  2      y := 2 * x;
      }

‣  3  proc ohwell(int y, proc waitwhat) {
          if (y < 10) {
‣  4          proc ohno(int x) {
‣  5              x := y * 2;
              }
‣  6          ohwell(y + 10, waitwhat);
          } else if (y < 20) {
‣  7          ohwell(y + 10, ohno);
          } else {
‣  8          int x = 0;
‣  9          waitwhat(x + y);
          }
‣ 10      print(x, y)
      }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

```
>
```

ohwell	6	waitwhat	ohno G
	5	y	25
		PC	8

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2     y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣  4         proc ohno(int x) {
‣  5             x := y * 2;
             }
‣  6         ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣  7         ohwell(y + 10, ohno);
         } else {
‣  8         int x = 0;
‣  9         waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	9
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
‣  0 int x = 5, y = 9

‣  1 proc ohno(int x) {
‣  2      y := 2 * x;
     }

‣  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
‣  4        proc ohno(int x) {
‣  5            x := y * 2;
           }
‣  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
‣  7        ohwell(y + 10, ohno);
        } else {
‣  8        int x = 0;
‣  9        waitwhat(x + y);
        }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

>

| ohno | 8 | x | 25 |
| | | PC | 2 |

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	9

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
▸  0  int x = 5, y = 9

▸  1  proc ohno(int x) {
▸  2      y := 2 * x;
      }

▸  3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
▸  4         proc ohno(int x) {
▸  5             x := y * 2;
            }
▸  6         ohwell(y + 10, waitwhat);
         } else if (y < 20) {
▸  7         ohwell(y + 10, ohno);
         } else {
▸  8         int x = 0;
▸  9         waitwhat(x + y);
         }
▸ 10      print(x, y)
      }

▸ 11  ohwell(x, ohno)
▸ 12  print(x, y)
```

IMPRIME

> (5,25)

| ohno | 8 | x | 25 |
| | | PC | 2 |

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (5,25) (5,15)

ohno	8	x	25
		PC	2

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (5,25) (5,15) (5,5)

| ohno | 8 | x | 25 |
| | | PC | 2 |

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | G |

```
0  int x = 5, y = 9

1  proc ohno(int x) {
2      y := 2 * x;
   }

3  proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
4          proc ohno(int x) {
5              x := y * 2;
           }
6          ohwell(y + 10, waitwhat);
       } else if (y < 20) {
7          ohwell(y + 10, ohno);
       } else {
8          int x = 0;
9          waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

> (5,25) (5,15) (5,5) (5,50)

ohno	8	x	25
		PC	2

ohwell	7	x	0
	6	waitwhat	ohno G
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

Global	G	y	50
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

y	G

ALCANCE DINÁMICO Y ASOCIACIÓN SUPERFICIAL

$X = 4, Y = 9, Z = 0$

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣  0  int x = 5, y = 9

‣  1  proc ohno(int x) {
‣  2      y := 2 * x;
       }

‣  3  proc ohwell(int y, proc waitwhat) {
          if (y < 10) {
‣  4          proc ohno(int x) {
‣  5              x := y * 2;
              }
‣  6          ohwell(y + 10, waitwhat);
          } else if (y < 20) {
‣  7          ohwell(y + 10, ohno);
          } else {
‣  8          int x = 0;
‣  9          waitwhat(x + y);
          }
‣ 10      print(x, y)
       }

‣ 11  ohwell(x, ohno)
‣ 12  print(x, y)
```

IMPRIME

>

ohwell	1	waitwhat	ohno G
	0	y	5
		PC	4

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
▸  0  int x = 5, y = 9

▸  1  proc ohno(int x) {
▸  2      y := 2 * x;
      }

▸  3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
▸  4          proc ohno(int x) {
▸  5              x := y * 2;
             }
▸  6          ohwell(y + 10, waitwhat);
         } else if (y < 20) {
▸  7          ohwell(y + 10, ohno);
         } else {
▸  8          int x = 0;
▸  9          waitwhat(x + y);
         }
▸ 10      print(x, y)
      }

▸ 11  ohwell(x, ohno)
▸ 12  print(x, y)
```

IMPRIME

>

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
 0 int x = 5, y = 9

 1 proc ohno(int x) {
 2     y := 2 * x;
   }

 3 proc ohwell(int y, proc waitwhat) {
       if (y < 10) {
 4         proc ohno(int x) {
 5             x := y * 2;
           }
 6         ohwell(y + 10, waitwhat);
       } else if (y < 20) {
 7         ohwell(y + 10, ohno);
       } else {
 8         int x = 0;
 9         waitwhat(x + y);
       }
10     print(x, y)
   }

11 ohwell(x, ohno)
12 print(x, y)
```

IMPRIME

>

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣ 0  int x = 5, y = 9

‣ 1  proc ohno(int x) {
‣ 2      y := 2 * x;
     }

‣ 3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣ 4          proc ohno(int x) {
‣ 5              x := y * 2;
             }
‣ 6          ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣ 7          ohwell(y + 10, ohno);
         } else {
‣ 8          int x = 0;
‣ 9          waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

```
>
```

ohwell	6	waitwhat	ohno 2
	5	y	25
		PC	8
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣ 0  int x = 5, y = 9

‣ 1  proc ohno(int x) {
‣ 2      y := 2 * x;
     }

‣ 3  proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
‣ 4         proc ohno(int x) {
‣ 5             x := y * 2;
           }
‣ 6         ohwell(y + 10, waitwhat);
        } else if (y < 20) {
‣ 7         ohwell(y + 10, ohno);
        } else {
‣ 8         int x = 0;
‣ 9         waitwhat(x + y);
        }
‣ 10    print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

```
>
```

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	9
ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7
ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6
Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

| y | 5 |

```
 0  int x = 5, y = 9

 1  proc ohno(int x) {
 2      y := 2 * x;
    }

 3  proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
 4          proc ohno(int x) {
 5              x := y * 2;
            }
 6          ohwell(y + 10, waitwhat);
        } else if (y < 20) {
 7          ohwell(y + 10, ohno);
        } else {
 8          int x = 0;
 9          waitwhat(x + y);
        }
10      print(x, y)
    }

11  ohwell(x, ohno)
12  print(x, y)
```

IMPRIME

>

| ohno | 8 | x | 25 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	9

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc	→	y	5
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
▸  0 int x = 5, y = 9

▸  1 proc ohno(int x) {
▸  2     y := 2 * x;
      }

▸  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
▸  4        proc ohno(int x) {
▸  5            x := y * 2;
            }
▸  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
▸  7        ohwell(y + 10, ohno);
        } else {
▸  8        int x = 0;
▸  9        waitwhat(x + y);
        }
▸ 10     print(x, y)
      }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

```
> (0,25)
```

| ohno | 8 | x | 50 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	7

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	6

| y | 5 |

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
▸ 0  int x = 5, y = 9

▸ 1  proc ohno(int x) {
▸ 2      y := 2 * x;
     }

▸ 3  proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
▸ 4         proc ohno(int x) {
▸ 5             x := y * 2;
            }
▸ 6         ohwell(y + 10, waitwhat);
        } else if (y < 20) {
▸ 7         ohwell(y + 10, ohno);
        } else {
▸ 8         int x = 0;
▸ 9         waitwhat(x + y);
        }
▸ 10     print(x, y)
     }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

```
> (0,25) (5,15)
```

| ohno | 8 | x | 50 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc	→	y	5
	1	waitwhat	ohno G
	0	y	5
		PC	6

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
‣ 0  int x = 5, y = 9

‣ 1  proc ohno(int x) {
‣ 2      y := 2 * x;
     }

‣ 3  proc ohwell(int y, proc waitwhat) {
         if (y < 10) {
‣ 4          proc ohno(int x) {
‣ 5              x := y * 2;
             }
‣ 6          ohwell(y + 10, waitwhat);
         } else if (y < 20) {
‣ 7          ohwell(y + 10, ohno);
         } else {
‣ 8          int x = 0;
‣ 9          waitwhat(x + y);
         }
‣ 10     print(x, y)
     }

‣ 11 ohwell(x, ohno)
‣ 12 print(x, y)
```

IMPRIME

> (0,25) (5,15) (5,5)

| ohno | 8 | x | 50 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

| y | 5 |

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	11

```
▸  0 int x = 5, y = 9

▸  1 proc ohno(int x) {
▸  2     y := 2 * x;
     }

▸  3 proc ohwell(int y, proc waitwhat) {
        if (y < 10) {
▸  4        proc ohno(int x) {
▸  5            x := y * 2;
           }
▸  6        ohwell(y + 10, waitwhat);
        } else if (y < 20) {
▸  7        ohwell(y + 10, ohno);
        } else {
▸  8        int x = 0;
▸  9        waitwhat(x + y);
        }
▸ 10     print(x, y)
     }

▸ 11 ohwell(x, ohno)
▸ 12 print(x, y)
```

IMPRIME

```
> (0,25) (5,15) (5,5) (5,9)
```

| ohno | 8 | x | 50 |
| | | PC | 5 |

ohwell	7	x	0
	6	waitwhat	ohno 2
	5	y	25
		PC	10

ohwell	4	waitwhat	ohno G
	3	y	15
		PC	10

ohwell	2	ohno	proc
	1	waitwhat	ohno G
	0	y	5
		PC	10

| y | 5 |

Global	G	y	9
	G	x	5
	G	ohno	proc
	G	ohwell	proc
		PC	12