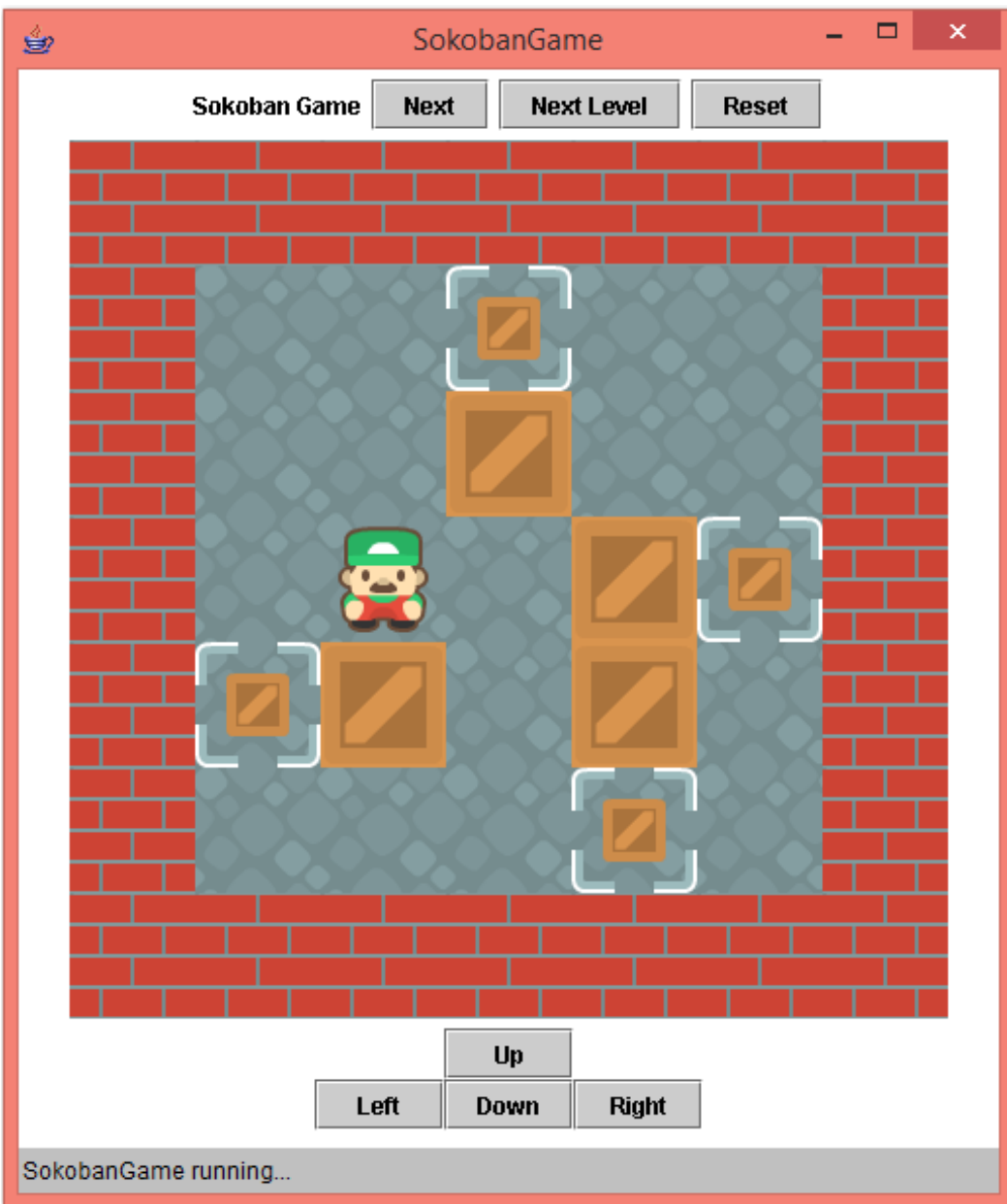


Sokoban Movement

Up, Down, Right, Left



```
int x = 3;
int y = 2;
char ground[] [] =
    { {'w', 'w', 'w', 'w', 'w', 'w', 'w'},
      {'w', 'n', 'n', 'g', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'g', 'w'},
      {'w', 'g', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'g', 'n', 'w'},
      {'w', 'w', 'w', 'w', 'w', 'w', 'w'} };
```

```
char top[] [] =
    { {'w', 'w', 'w', 'w', 'w', 'w', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'b', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'b', 'n', 'w'},
      {'w', 'n', 'b', 'n', 'b', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'w', 'w', 'w', 'w', 'w', 'w'} };
```



gn.png

Ground = **g**oal

Top = **n**othing



gb.png

Ground = **g**oal

Top = **b**ox



nn.png

Ground = **n**othing

Top = **n**othing



nb.png

Ground = **n**othing

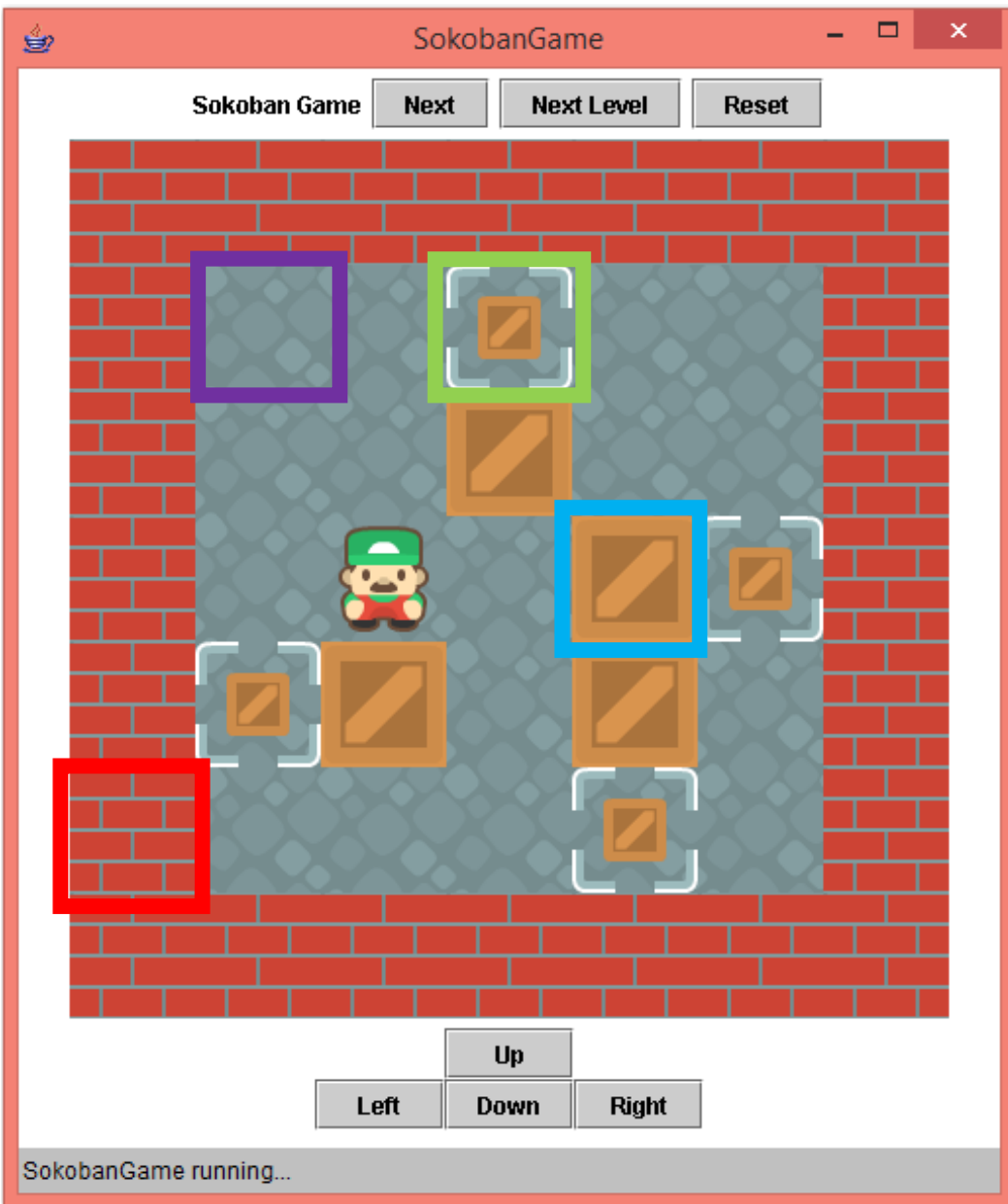
Top = **b**ox



ww.png

Ground = **w**all

Top = **w**all



gn.png



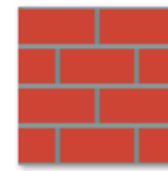
gb.png



nn.png



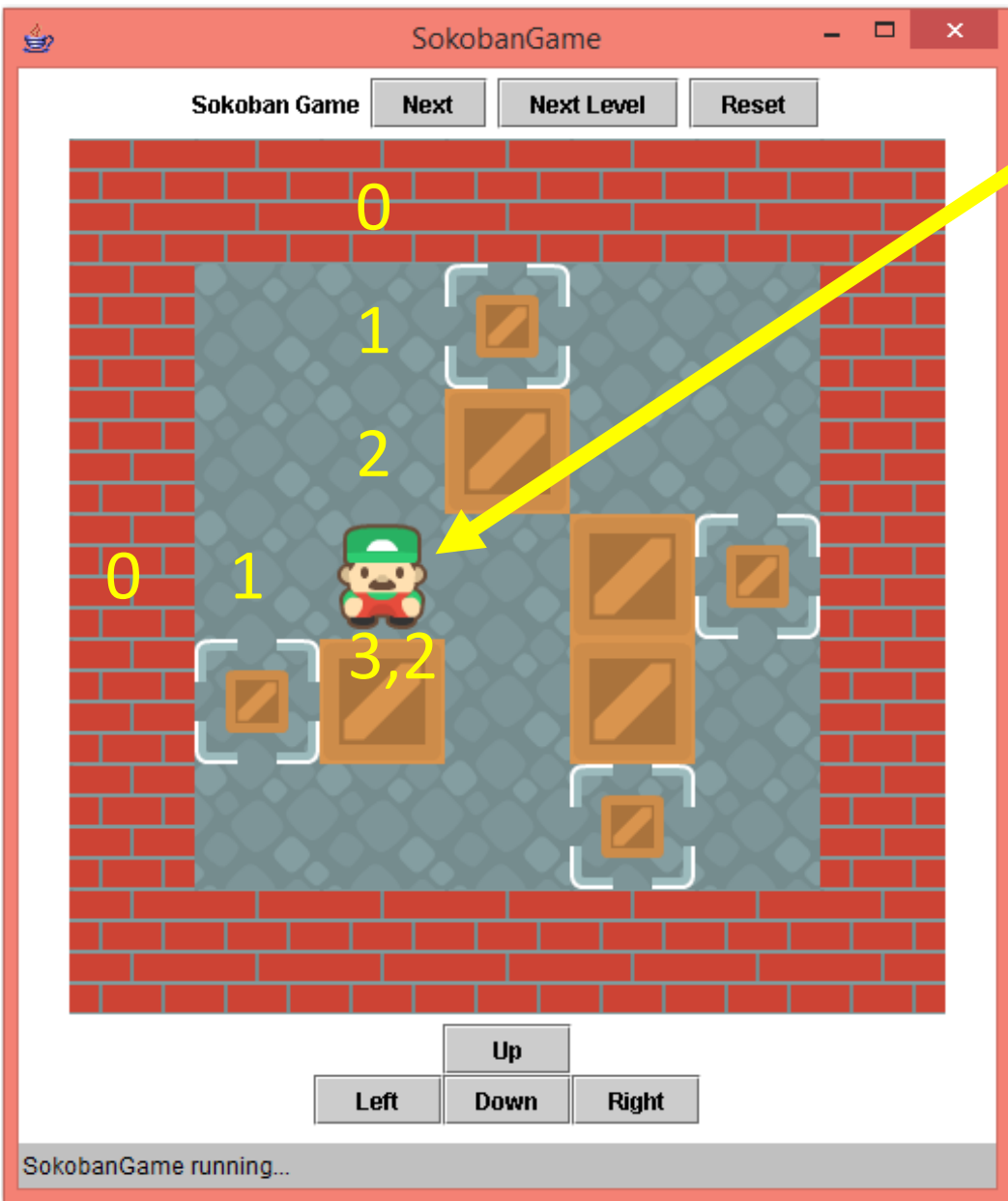
nb.png



ww.png

```
int x = 3;
int y = 2;
char ground[] [] =
    { {'w', 'w', 'w', 'w', 'w', 'w', 'w'},
      {'w', 'n', 'n', 'g', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'g', 'w'},
      {'w', 'g', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'g', 'n', 'w'},
      {'w', 'w', 'w', 'w', 'w', 'w', 'w'} };
```

```
char top[] [] =
    { {'w', 'w', 'w', 'w', 'w', 'w', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'b', 'n', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'n', 'b', 'n', 'b', 'n', 'w'},
      {'w', 'n', 'n', 'n', 'n', 'n', 'w'},
      {'w', 'w', 'w', 'w', 'w', 'w', 'w'} };
```



```

int x = 3;
int y = 2;
char ground[] [] =
    {{ 'w', 'w', 'w', 'w', 'w', 'w', 'w' },
      { 'w', 'n', 'n', 'g', 'n', 'n', 'w' },
      { 'w', 'n', 'n', 'n', 'n', 'n', 'w' },
      { 'w', 'n', 'n', 'n', 'n', 'g', 'w' },
      { 'w', 'g', 'n', 'n', 'n', 'n', 'w' },
      { 'w', 'n', 'n', 'n', 'g', 'n', 'w' },
      { 'w', 'w', 'w', 'w', 'w', 'w', 'w' } };

```

```

char top[] [] =
    {{ 'w', 'w', 'w', 'w', 'w', 'w', 'w' },
      { 'w', 'n', 'n', 'n', 'n', 'n', 'w' },
      { 'w', 'n', 'n', 'b', 'n', 'n', 'w' },
      { 'w', 'n', 'n', 'n', 'b', 'n', 'w' },
      { 'w', 'n', 'b', 'n', 'b', 'n', 'w' },
      { 'w', 'n', 'n', 'n', 'n', 'n', 'w' },
      { 'w', 'w', 'w', 'w', 'w', 'w', 'w' } };

```



x-1, y



```
public void moveUp ()
{
    //wall
    if (top [x - 1] [y] == 'w')
        showStatus ("Wall. Can't go there");
    //either goal or nothing
    else if (top [x - 1] [y] == 'n')
    {
        x--;
        showStatus ("Moving up");
    }
    //box
    else if (top [x - 1] [y] == 'b')
    {
        if (x - 2 >= 0 && top [x - 2] [y] == 'n')
        {
            top [x - 2] [y] = 'b';
            top [x - 1] [y] = 'n';
            x--;
            showStatus ("Pushing the box!");
        }
        else
            showStatus ("Box can't move there");
    }
    //update screen
    redraw ();
    a [x * col + y].setIcon (createImageIcon (ground [x] [y] + "up.png"));
}
```



x-1, y

```
public void moveUp ()
{
    //wall
    if (top [x - 1] [y] == 'w')
        showStatus ("Wall. Can't go there");
    //either goal or nothing
    else if (top [x - 1] [y] == 'n')
    {
        x--;
        showStatus ("Moving up");
    }
    //box
    else if (top [x - 1] [y] == 'b')
    {
        if (x - 2 >= 0 && top [x - 2] [y] == 'n')
        {
            top [x - 2] [y] = 'b';
            top [x - 1] [y] = 'n';
            x--;
            showStatus ("Pushing the box!");
        }
        else
            showStatus ("Box can't move there");
    }
    //update screen
    redraw ();
    a [x * col + y].setIcon (createImageIcon (ground [x] [y] + "up.png"));
}
```

Edge guard
is $x-2 \geq 0$



$x-2, y$



$x-1, y$



```
public void moveUp ()
{
    //wall
    if (top [x - 1] [y] == 'w')
        showStatus ("Wall. Can't go there");
    //either goal or nothing
    else if (top [x - 1] [y] == 'n')
    {
        x--;
        showStatus ("Moving up");
    }
    //box
    else if (top [x - 1] [y] == 'b')
    {
        if (x - 2 >= 0 && top [x - 2] [y] == 'n')
        {
            top [x - 2] [y] = 'b';
            top [x - 1] [y] = 'n';
            x--;
            showStatus ("Pushing the box!");
        }
        else
            showStatus ("Box can't move there");
    }
    //update screen
    redraw ();
    a [x * col + y].setIcon (createImageIcon (ground [x] [y] + "up.png"));
}
```


Up -
Original

Edge guard
is $x-2 \geq 0$



$x-2, y$



$x-1, y$



```
public void moveUp ()
{
    //wall
    if (top [x - 1] [y] == 'w')
        showStatus ("Wall. Can't go there");
    //either goal or nothing
    else if (top [x - 1] [y] == 'n')
    {
        x--;
        showStatus ("Moving up");
    }
    //box
    else if (top [x - 1] [y] == 'b')
    {
        if (x - 2 >= 0 && top [x - 2] [y] == 'n')
        {
            top [x - 2] [y] = 'b';
            top [x - 1] [y] = 'n';
            x--;
            showStatus ("Pushing the box!");
        }
        else
            showStatus ("Box can't move there");
    }
    //update screen
    redraw ();
    a [x * col + y].setIcon (createImageIcon (ground [x] [y] + "up.png"));
}
```

Down -
You change



$x+1, y$



$x+2, y$

Edge guard
is $x+2 < \text{row}$