

# How to create an SVG file

## 1.Content

How to create an SVG file .....	1
1. Content.....	1
2. What is SVG .....	1
2.1. General.....	1
2.2. Editors.....	2
3. SVG in Programming2.....	2
4. Create an SVG file from the level image file.....	3
5. Create an SVG file from a black/white image file .....	5
6. References .....	9
6.1. SVG wikipedia .....	9
6.2. SVG Path element .....	9
6.3. Inkscape .....	9

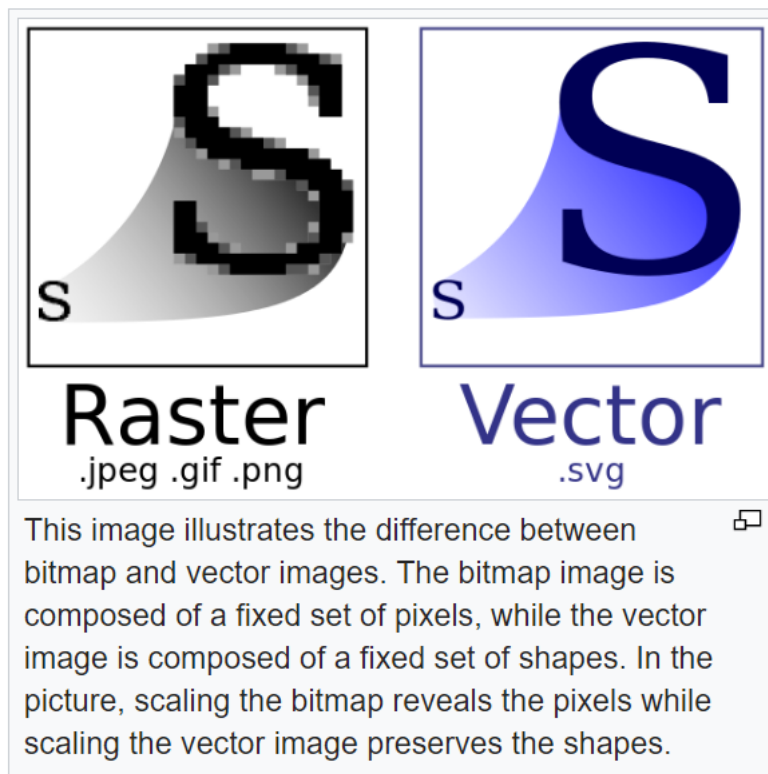
## 2.What is SVG

### 2.1. General

SVG is the abbreviation of Scalable Vector Graphics. From Wikipedia [SVG wikipedia](#) we learn that it has following properties.

- An XML-based vector image format for 2 dimensional graphics
- An open standard development by the [World Wide Web Consortium](#) (W3C) since 1999.
- Supported by all modern web-browsers

Following images from Wikipedia illustrate very well the difference between bitmap and vector images. As the SVG format describes the image in a mathematical way with line segment, curve ... definitions, scaling it doesn't influence the quality.



## 2.2. Editors

As it is a text file, SVG images can be created and edited with any text editor, but also with [Inkscape](#) a free SVG editor.

## 3.SVG in Programming2

As an SVG file contains specifications of line segments, these can be used to define the vertices of the level's hit region.

These line segments are described in the d-attribute of the path-element [SVG Path element](#)

The **SvgParser** class of Programming2 has a function **GetVerticesFromSvgFile** that reads the d-attribute of the Path elements and converts the line segments definitions into a collection of vertices. Each path element is stored in a vector of Point2f type elements. All those vectors are stored in another vector **vertices**.

```
static bool GetVerticesFromSvgFile(const std::string& filePath,
    std::vector<std::vector<Point2f>> &vertices);
```

The offered functionality has some constraints although. The d-attribute should contain line segment definitions only (no curves).

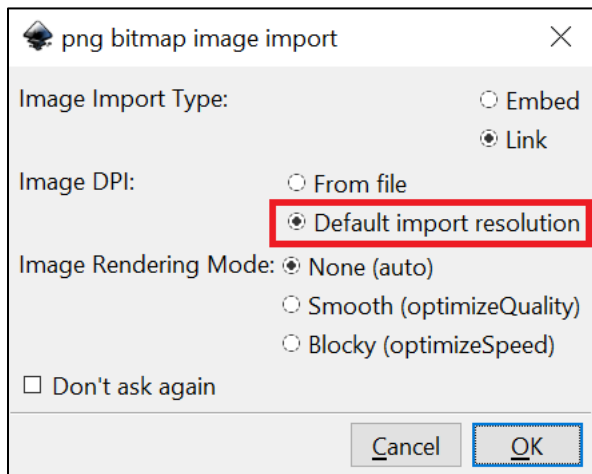
With the Inkscape application you can create the SVG files needed in your game, you can download it here [Inkscape](#)


## 4. Create an SVG file from the level image file

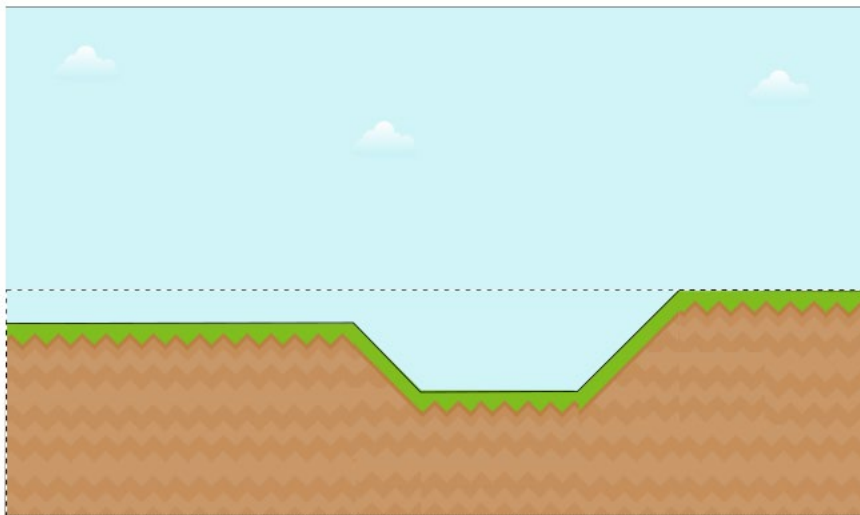
Next steps show how you can create an SVG file from the level image file so that it can be loaded by the SvgParser.


**You should follow these steps precisely.**

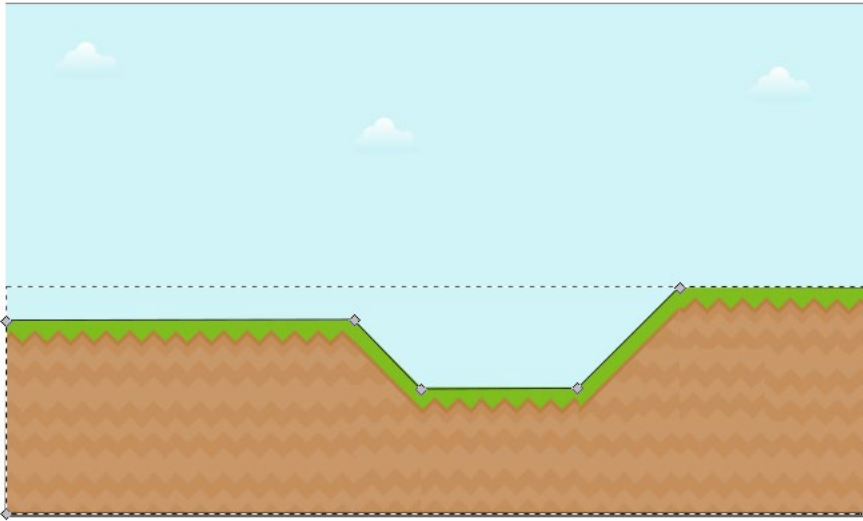
1. Start Inkscape.
2. Open the level image from the menu bar: **File>Open**. It is **important** that you change the **Image DPI** setting, choose "Default import resolution"





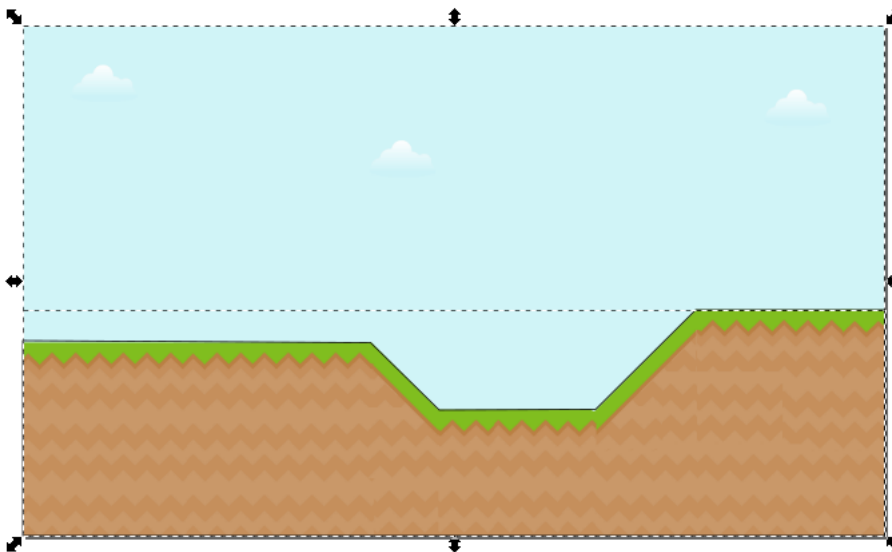
3. Then you click the vertices of the level's hit region, using the "Draw Bezier curves and straight lines (Shift + F6)" tool . Close the path by selecting the first point again.



4. Choose "Edit paths by node (F2)" tool  and you see the path vertices.



5. Then we need to put this HitRegion at the right place in the level. Press the "Select and transform objects (F1)" tool  and then press the "Select all nodes" button .



6. Then choose *File>Save As* and choose "Inkscape SVG" type

Save as type:

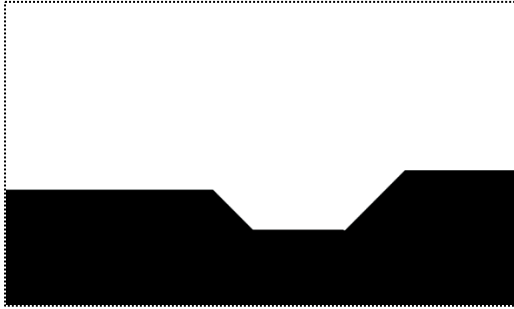
7. Open the generated svg file in text editor e.g. and have a look at the d-attribute in the path element. Only the z, m, l, h and v commands are handled by the SvgParser class. These commands can be upper- or lower-case.

## 5. Create an SVG file from a black/white image file

You should follow these steps precisely.

1. Draw a black / white layer over the level bitmap using e.g. Photoshop

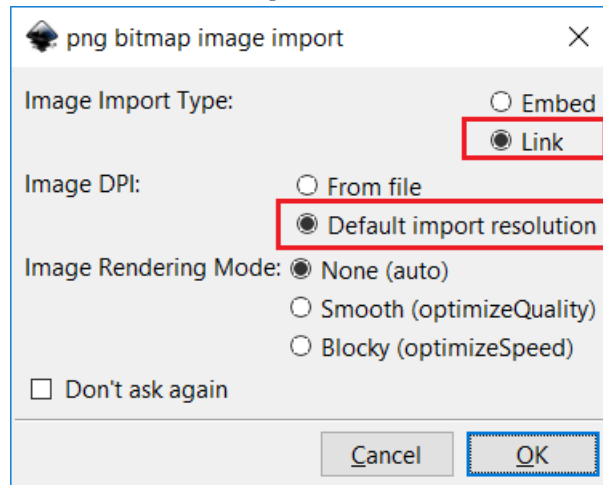
- Black is what hits
- White is no hit



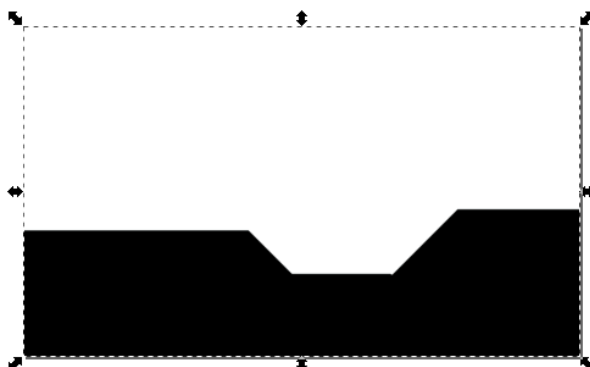
2. Save it as a bitmap file e.g. bmp, png

3. Start Inkscape

4. Open this black/white bitmap file with menu **File>Open** (do not drag and drop). Adapt the import properties: choose **link** as import type and **Default import resolution** for DPI.

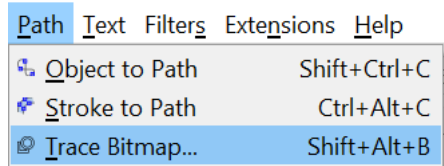


Select the bitmap by clicking it.

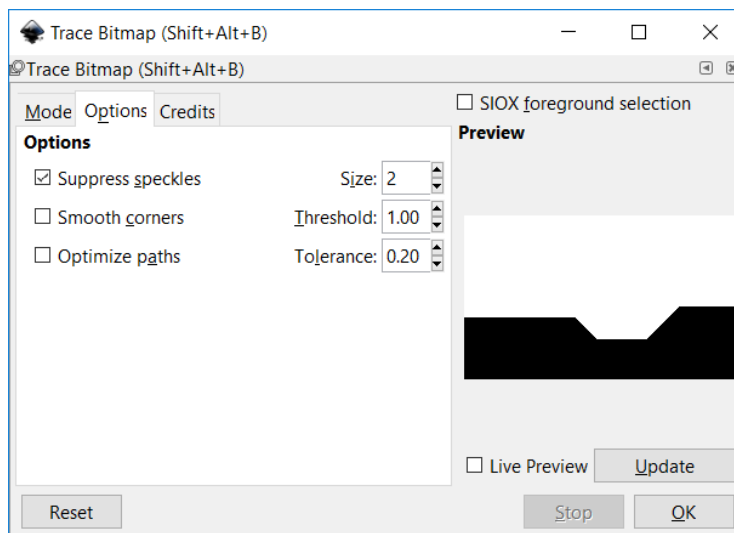
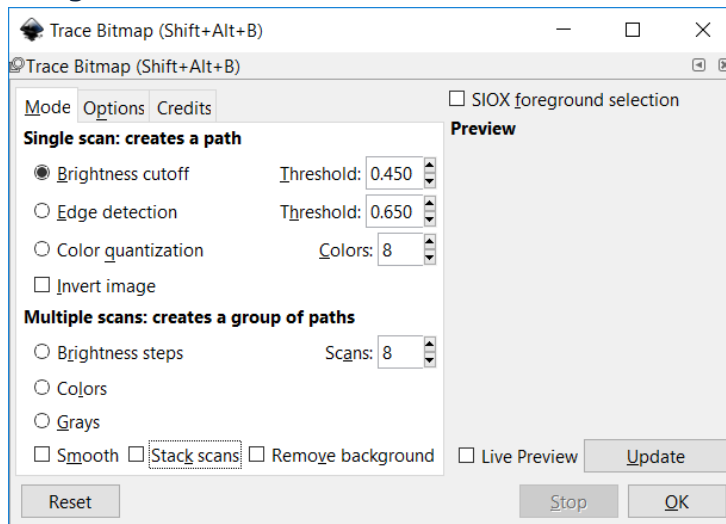


5. Trace the bitmap as follows:

a. Choose menu **Path>Trace Bitmap**

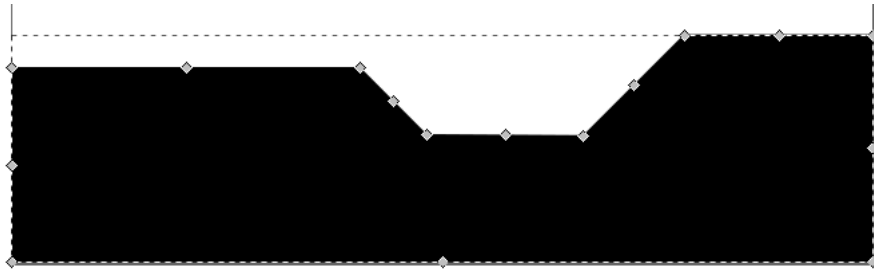


b. Change the **Mode** and **Options** settings as indicated in the images below.



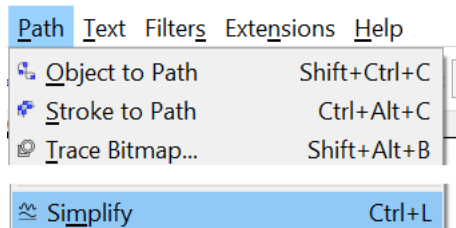
c. Click the OK button and close this Trace window.

6. Check the path by selecting the "Edit path by nodes" tool 

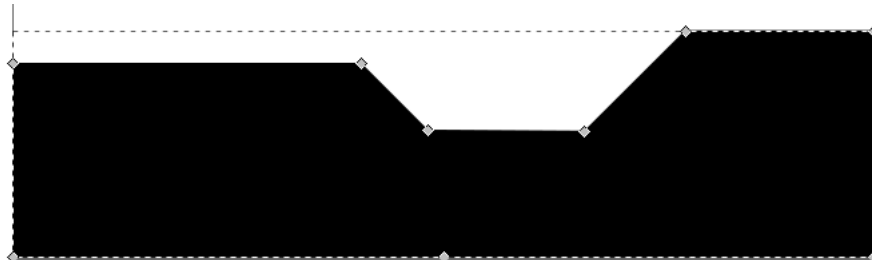



7. **The less vertices**, the faster the Raycast function will perform. So **optionally** reduce the number of nodes as explained in the following steps.

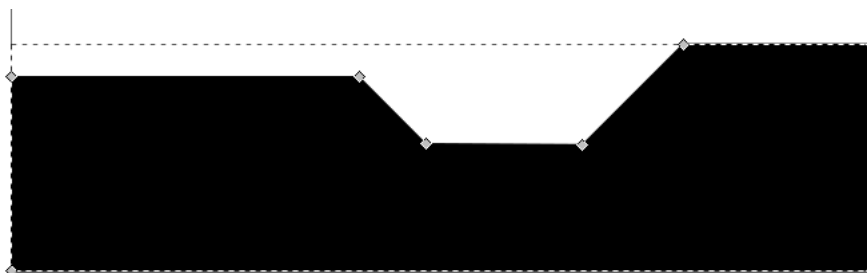
- a. Using the **simplify** function in menu Path



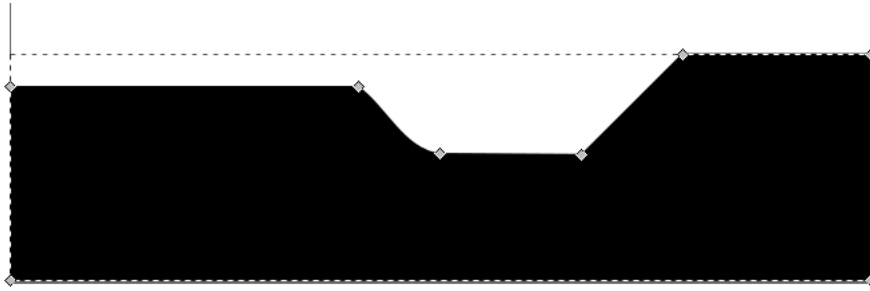
The screenshot below shows the nodes after this step. Notice that some nodes are removed.



- b. **Manually** edit the nodes if needed after previous simplify step. In the following image we removed manually the node in the middle at the bottom of the level. Select the nodes and then press the "Delete selected nodes" button .

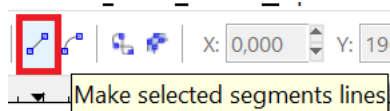


8. **Mandatory:** Remove all Bezier segments. Suppose we have this path with a Bezier.

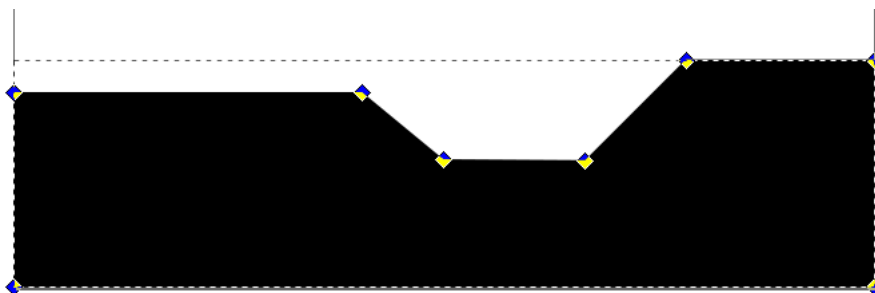


Then follow next steps to replace the Beziers by line segments:

- Select the "Edit Path By Nodes" tool (F2).
- Click on your path to select it
- Ctrl-A to select all the nodes in that path
- Click the button "Make Selected Segments Lines" or push Shift+L



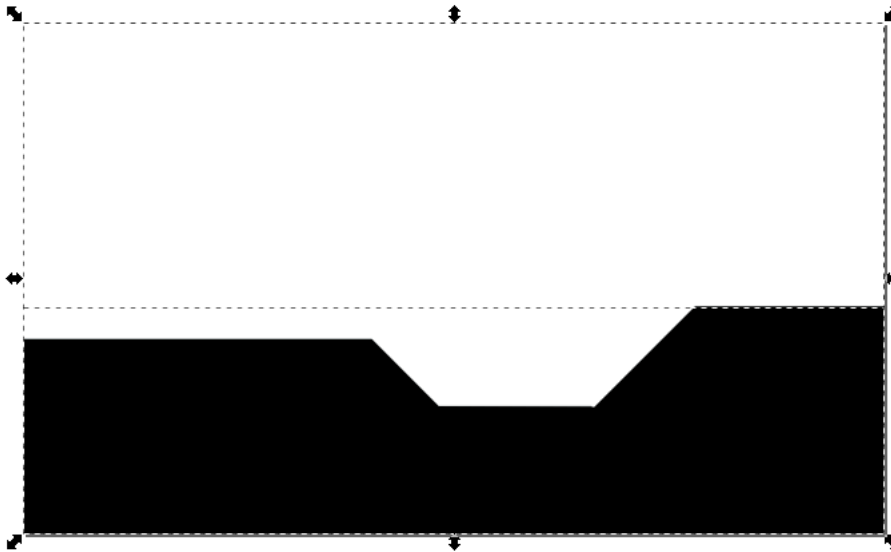
This is the result.



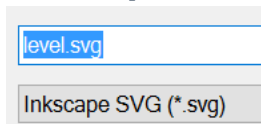
9. Then we need to put this hit region at the right place in the level. Press the "Select and transform objects (F1)" tool and then press the



“Select all nodes” button  or draw a rectangle around the whole.



10. Optional: If there are several platforms or separate “black areas” in the bitmap, they need to be saved as separate paths in the xml file; select the menu item Path/break apart. After parsing the file, you will have one element (vector of points) per path.
11. Save the file by choosing Menu **File>Save As**, only **Plain SVG** or **Inkscape SVG** are allowed



## 6. References

### 6.1. SVG wikipedia

[https://en.wikipedia.org/wiki/Scalable\\_Vector\\_Graphics](https://en.wikipedia.org/wiki/Scalable_Vector_Graphics)

### 6.2. SVG Path element

<http://www.w3.org/TR/SVG/paths.html#PathData>

### 6.3. Inkscape

<https://inkscape.org/nl/download/windows/>