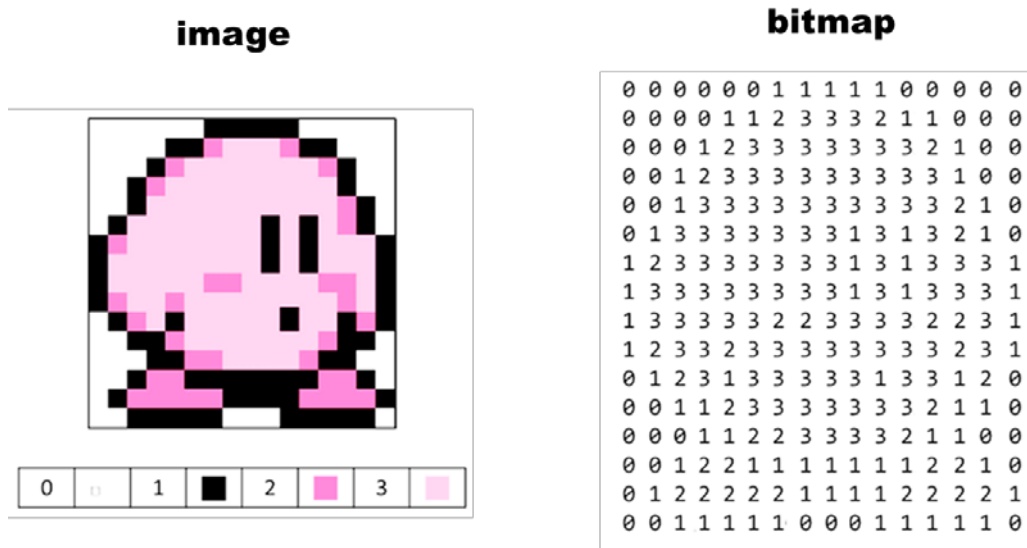# Lab 12- VGA Display

The purpose of this lab is to practice VGA display.

Lab 12.1:

Draw a Kirby image on screen.

Kirby is a game character developed by Nintendo. He fights to protect and save his home on the distant Planet Popstar from a variety of threats. Below is the Kirby image and its compressed 16x16 bitmap.

- 16x16 bitmap 的每一個畫素都有一個對應數字顯示 Kirby 的顏色.
  0 : white,　1 : black,　2 : momo pink,　3: pink
- 請在螢幕上畫出這個 Kirby image, 並將 16x16 bitmap 的每一個畫素對應到 VGA 螢幕的 20x20 pixels, 也就是說將 16x16 畫素 bitmap 放大 20 倍成 320x320 pixels bitmap.
- 參考程式碼: kirby.vhd.

Lab 12.2:

- 在 VGA 螢幕中間顯示一個 20x20 pixels 的白色方塊
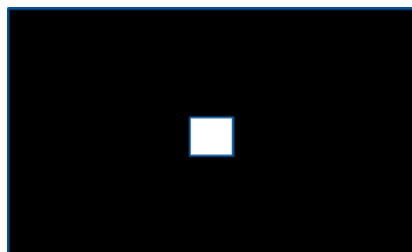
- 按下鍵盤'→'鍵, 方塊往右移 20 pixels; 按下鍵盤'←'鍵, 方塊往左移 20 pixels;
  按下鍵盤'↑'鍵, 方塊往上移 20 pixels; 按下鍵盤'↓'鍵, 方塊往下移 20 pixels.
- 當方塊右移碰到右邊界時, 即不再向右移動, 其他方向的移動亦同.
- Use KEY0 as an active-low asynchronous reset, such that the 20x20 pixels white block is shown in the central screen when KEY0 is pressed.

Lab-report:

Submit a lab report on **ilearn** by 11:00pm the day before of next lab. (The lab report must be a **PDF** file.)

Your Lab report should include the following items:

1) VHDL design for Lab12.1.

2) VHDL design for Lab12.2.

3) Observations and comments.