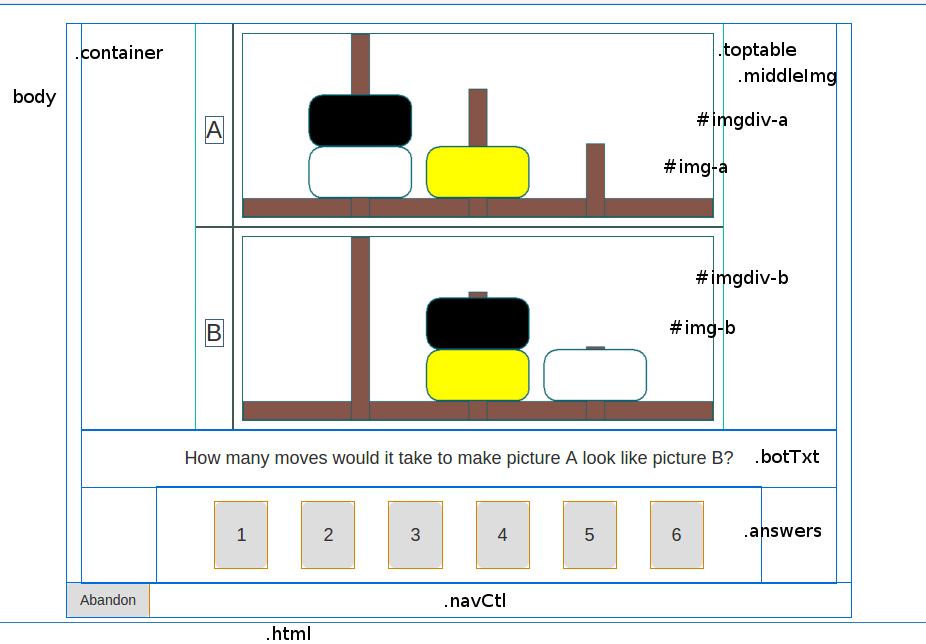
# Hoops Quiz : structure, technology and algorithms

## Contents

* Representation of the elements in the page, description of the purpose of each.
* Image dimensions
* Description of scaling algorithm
* Worked numeric examples for screen resolutions of (HxV) 1280x1024, 640x480, 320x480, 750x1334 and 1242x2208
* Names of any included libraries

## Description of page elements



hoops layout

representation of the HTML elements in the hoops puzzle, with a description of the purpose of each.

body HTML <body> tag  
#devBar hidden   
div.container Used to add page margins  
div#pages Container to switch the pages  
div.page#game Container for the main puzzle  
div.middleImg Contains for images, e.g. intro or game  
div.toptable-container A container for the game images  
table.toptable Table containing the two images for each puzzle  
td#imgdiv-a Containing cell for the upper image  
img#img-a The upper image, which is the same on each page  
td#imgdiv-b Containing cell for the lower image  
img#img-b The lower image, which is different on each page  
div.botTxt Holds the explanatory text when required  
div.answers Holds the buttons 1-6, as required  
div.navCtl Holds the "Prev/Next" buttons, as needed

### Element heights (top to bottom)

html -  
body -  
#devBar hidden  
div.container padding-top: 15px  
div#pages -  
div#game -  
div.middleImg -  
table.toptable   
td#imgdiv-a   
img#img-a   
td#imgdiv-b   
img#img-b   
div.middleImg -  
div.botText 72px minimum (if not wrapped) (if visible)  
div#answers -  
div.navCtl   
div#pages -  
div#abandon-div 34px (if visible)  
div.container padding-bottom: 20px  
body -  
html -

## Image Dimensions

The images are all PNG format, 8-bit/color RGBA, non-interlaced. There are five images, one for each page, in the introduction: intro1.png to intro5.png. They have the dimensions 748px x 470px. Apart from the intro screens, the other images are 748px x 291px, two on each screen, one at the top, one at the bottom.

The image at the top remains constant (this is different from the original test, where the bottom image remains constant). Its name is top-constant.png

The other images change on each page in a psuedo-random fashion. I have name them in the format:

t3<x>2<y>1<z>.png

where:

* t stands for tile
* 3 is the leftmost peg, which can hold 3 hoops
* <x> is a sequence of letters describing which hoops are on the peg denoted by the preceding number, from top to bottom, using the letters y, b and w for Yellow, Black and White, respectively.
* 2 is the middle peg, which can hold 2 hoops
* <y> is the sequence of hoops from top to bottom on the middle peg
* 1 is the rightmost peg, which can hold 1 hoop
* <z> is the sequence of hoops from top to bottom on the rightmost peg

Thus, we have the images:

t32by1w.png, t32wy1b.png, t3bw21y.png, t3w2b1y.png, t3w2yb1.png, t3wb2y1.png, t3wy2b1.png, t3y2b1w.png, t3yb21w.png, t3ybw21.png, t3yw21b.png, t3yw2b1.png, t3ywb21.png

## Description of Scaling Algorithm

#### Pseudo-code for scaling algorithm

get natural width/height (naturalFullWidth/Height)  
get window width/height ($(window).width()/height)  
  
vertical shrink = window height / naturalFullHeight  
horizontal shrink = window width / naturalFullWidth  
  
scale = vShrink < hShrink ? vShrink : hShrink  
  
targetHeight = naturalFullHeight \* scale  
targetWidth = naturalFullWidth \* scale  
  
targetMiddleHeight = targetHeight - heightExtras  
  
# height/width ratio of .middleImg  
middleHWRatio = 1.15  
  
# what innerWidth of .gridContainer would create targetMiddleHeight?  
targetMiddleWidth = targetMiddleHeight \* middleHWRatio  
  
# set margins on .gridContainer to achieve targetWidth and targetHeight  
margins = (window.width - widthExtra) / 2

#### JavaScript code for scaling algorithm

var topWidth = 748, topHeight = 291, botWidth = 748, botHeight = 291;  
  
var widthExtra =  
 ($('.container').outerWidth(true) - $('.container').width()) +  
 ($('#pages').outerWidth(true) - $('#pages').width());  
  
var heightExtra =  
 ($('.container').outerHeight(true) - $('.container').height()) +  
 ($('.topTxt').is(':visible') ? $('.topTxt').height() : 0) +  
 ($('#imgdiv-a').is(':visible') ? $('#imgdiv-a').outerHeight(true) - $('#imgdiv-a').height() : 0) +  
 ($('#imgdiv-b').is(':visible') ? $('#imgdiv-b').outerHeight(true) - $('#imgdiv-b').height() : 0) +  
 ($('.botTxt').is(':visible') ? $('.botTxt').height() : 0) +  
 ($('#answers').is(':visible') ? $('#answers').height() : 0) +  
 ($('.navTxt').is(':visible') ? $('.navTxt').height() : 0) +  
 ($('.navCtl').is(':visible') ? $('.navCtl').height() : 0);  
  
var naturalFullWidth = widthExtra + topWidth;  
var naturalFullHeight = heightExtra + topHeight + botHeight;  
  
var scaleV = ($(window).height()) / naturalFullHeight;  
var scaleH = $(window).width() / naturalFullWidth;  
var scale = scaleV <= scaleH ? scaleV : scaleH;  
  
var targetWidth = naturalFullWidth \* scale;  
var targetHeight = naturalFullHeight \* scale;  
var targetMiddleHeight = targetHeight - heightExtra;  
var middleHWRatio = 1.15;  
var targetMiddleWidth = targetMiddleHeight \* middleHWRatio;  
  
var setMargins = ($(window).width() - widthExtra - targetMiddleWidth) / 2;  
if (setMargins > 0) {  
 $('.middleImg').css('margin-left', setMargins);  
 $('.middleImg').css('margin-right', setMargins);  
} else {  
 $('.middleImg').css('margin-left', 0);  
 $('.middleImg').css('margin-right', 0);  
}

## Worked Examples

Worked numeric examples for screen resolutions of (HxV) 1280x1024, 640x480, 320x480, 750x1334 and 1242x2208

### 1280x1024

topWidth: 748, topHeight: 291, botWidth: 748, botHeight: 291  
widthExtra =   
 (container.outerWidth [1280] - container.width [1260]) [20] +   
 pages.outerWidth [1260] - pages.width [1260]) [0] +   
 == 20  
heightExtra =  
 (container.outerHeight [839] - container.height [804]) [35] +   
 topTxt.height [0] +   
 (#imgdiv-a.outerHeight [294] - #imgdiv-a.height [274]) [20] +   
 (#imgdiv-b.outerHeight [294] - #imgdiv-b.height [274]) [20] +   
 botTxt.height [-36] +   
 #answers.height [96] +  
 navTxt.height [0] +  
 navCtl.height [-15] +  
 == 120  
naturalFullWidth =  
 widthExtra [20] + topWidth [748] == 768  
naturalFullHeight =  
 heightExtra [120] + topHeight [291] + botHeight [291]  
 == 702  
scaleV = window.height [1024] / naturalFullHeight [702] == 1.46  
scaleH = window.width [1280] / naturalFullWidth [768] == 1.67  
scale = scaleV [1.46] <= scaleH [1.67] ? 1.46  
targetWidth = naturalFullWidth [768] \* scale [1.46] == 1120.27  
targetHeight = naturalFullHeight [702] \* scale [1.46] == 1024.00  
targetMiddleHeight = targetHeight [1024] - heightExtra [120] == 904  
targetMiddleWidth = targetMiddleHeight [904] \* middleHWRatio [1.15] == 1039  
setMargins = window.width [1280] - widthExtra [20] - targetMiddleWidth [1039]) / 2 == 110  
setMargins > 0: true  
 middleImg.margin-left = 110  
 middleImg.margin-right = 110

### 640x480

topWidth: 748, topHeight: 291, botWidth: 748, botHeight: 291  
widthExtra =   
 (container.outerWidth [640] - container.width [620]) [20] +   
 pages.outerWidth [620] - pages.width [620]) [0] +   
 == 20  
heightExtra =  
 (container.outerHeight [454] - container.height [419]) [35] +   
 topTxt.height [0] +   
 (#imgdiv-a.outerHeight [132] - #imgdiv-a.height [112]) [20] +   
 (#imgdiv-b.outerHeight [132] - #imgdiv-b.height [112]) [20] +   
 botTxt.height [-28] +   
 #answers.height [60] +  
 navTxt.height [0] +  
 navCtl.height [-15] +  
 == 92  
naturalFullWidth =  
 widthExtra [20] + topWidth [748] == 768  
naturalFullHeight =  
 heightExtra [92] + topHeight [291] + botHeight [291]  
 == 674  
scaleV = window.height [480] / naturalFullHeight [674] == 0.71  
scaleH = window.width [640] / naturalFullWidth [768] == 0.83  
scale = scaleV [0.71] <= scaleH [0.83] ? 0.71  
targetWidth = naturalFullWidth [768] \* scale [0.71] == 546  
targetHeight = naturalFullHeight [674] \* scale [0.71] == 480  
targetMiddleHeight = targetHeight [480] - heightExtra [92] == 388  
targetMiddleWidth = targetMiddleHeight [388] \* middleHWRatio [1.15] == 446  
setMargins = window.width [640] - widthExtra [20] - targetMiddleWidth [446]) / 2 == 86  
setMargins > 0: true  
 middleImg.margin-left = 86  
 middleImg.margin-right = 86

### 320x480

topWidth: 748, topHeight: 291, botWidth: 748, botHeight: 291  
widthExtra =   
 (container.outerWidth [320] - container.width [300]) [20] +   
 pages.outerWidth [300] - pages.width [300]) [0] +   
 == 20  
heightExtra =  
 (container.outerHeight [339] - container.height [304]) [35] +   
 topTxt.height [0] +   
 (#imgdiv-a.outerHeight [76] - #imgdiv-a.height [56]) [20] +   
 (#imgdiv-b.outerHeight [76] - #imgdiv-b.height [56]) [20] +   
 botTxt.height [-28] +   
 #answers.height [38] +  
 navTxt.height [0] +  
 navCtl.height [-15] +  
 == 70  
naturalFullWidth =  
 widthExtra [20] + topWidth [748]   
 == 768  
naturalFullHeight =  
 heightExtra [70] + topHeight [291] + botHeight [291]  
 == 652  
scaleV = window.height [480] / naturalFullHeight [652] == 0.74  
scaleH = window.width [320] / naturalFullWidth [768] == 0.42  
scale = scaleV [0.74] <= scaleH [0.42] ? 0.42  
targetWidth = naturalFullWidth [768] \* scale [0.42] == 320  
targetHeight = naturalFullHeight [652] \* scale [0.42] == 271  
targetMiddleHeight = targetHeight [271] - heightExtra [70] == 201  
targetMiddleWidth = targetMiddleHeight [201] \* middleHWRatio [1.15] == 231  
setMargins = window.width [320] - widthExtra [20] - targetMiddleWidth [231]) / 2 == 34  
setMargins > 0: true  
 middleImg.margin-left = 34  
 middleImg.margin-right = 34

### 750x1334

topWidth: 748, topHeight: 291, botWidth: 748, botHeight: 291  
widthExtra =   
 (container.outerWidth [750] - container.width [730]) [20] +   
 pages.outerWidth [730] - pages.width [730]) [0] +   
 == 20  
heightExtra =  
 (container.outerHeight [601] - container.height [566]) [35] +   
 topTxt.height [0] +   
 (#imgdiv-a.outerHeight [187] - #imgdiv-a.height [167]) [20] +   
 (#imgdiv-b.outerHeight [187] - #imgdiv-b.height [167]) [20] +   
 botTxt.height [-28] +   
 #answers.height [96] +  
 navTxt.height [0] +  
 navCtl.height [-15] +  
 == 128  
naturalFullWidth =  
 widthExtra [20] + topWidth [748] == 768  
naturalFullHeight =  
 heightExtra [128] + topHeight [291] + botHeight [291]  
 == 710  
scaleV = window.height [1334] / naturalFullHeight [710] == 1.88  
scaleH = window.width [750] / naturalFullWidth [768] == 0.98  
scale = scaleV [1.88] <= scaleH [0.98] ? 0.98  
targetWidth = naturalFullWidth [768] \* scale [0.98] == 750  
targetHeight = naturalFullHeight [710] \* scale [0.98] == 693  
targetMiddleHeight = targetHeight [693] - heightExtra [128] == 565  
targetMiddleWidth = targetMiddleHeight [565] \* middleHWRatio [1.15] == 650  
setMargins = window.width [750] - widthExtra [20] - targetMiddleWidth [650]) / 2 == 39  
setMargins > 0: true  
 middleImg.margin-left = 39  
 middleImg.margin-right = 39

### 1242x2208

topWidth: 748, topHeight: 291, botWidth: 748, botHeight: 291  
widthExtra =   
 (container.outerWidth [1242] - container.width [1222]) [20] +   
 pages.outerWidth [1222] - pages.width [1222]) [0] +   
 == 20  
heightExtra =  
 (container.outerHeight [909] - container.height [874]) [35] +   
 topTxt.height [0] +   
 (#imgdiv-a.outerHeight [328] - #imgdiv-a.height [308]) [20] +   
 (#imgdiv-b.outerHeight [328] - #imgdiv-b.height [308]) [20] +   
 botTxt.height [-36] +   
 #answers.height [96] +  
 navTxt.height [0] +  
 navCtl.height [-15] +  
 == 120  
naturalFullWidth =  
 widthExtra [20] + topWidth [748] == 768  
naturalFullHeight =  
 heightExtra [120] + topHeight [291] + botHeight [291]  
 == 702  
scaleV = window.height [2208] / naturalFullHeight [702] == 3.15  
scaleH = window.width [1242] / naturalFullWidth [768] == 1.62  
scale = scaleV [3.15] <= scaleH [1.62] ? 1.62  
targetWidth = naturalFullWidth [768] \* scale [1.62] == 1242  
targetHeight = naturalFullHeight [702] \* scale [1.62] == 1135  
targetMiddleHeight = targetHeight [1135] - heightExtra [120] == 1015  
targetMiddleWidth = targetMiddleHeight [1015] \* middleHWRatio [1.15] == 1167  
setMargins = window.width [1242] - widthExtra [20] - targetMiddleWidth [1167]) / 2 == 27  
setMargins > 0: true  
 middleImg.margin-left = 27  
 middleImg.margin-right = 27

## List of Libraries

names of any included libraries (e.g. node.js)

jquery.js  
jquery-ui.css  
modernizr.js  
browser-sync.js  
bootstrap.css  
bootstrap-sass

The build system was created by yeoman running on node.js via npm. It uses the gulp task runner to perform SASS compilation, testing, linting, synchronised browsing, minification, and front-end package management via bower. The CSS framework is Bootstrap, though I have overridden a lot of it to make things simpler. The code in main.js uses jQuery.

http://yeoman.io/  
https://nodejs.org/  
https://www.npmjs.com  
http://gulpjs.com  
http://sass-lang.com/  
https://bower.io/  
http://getbootstrap.com/  
https://jquery.com/

## Database table for Hoops Quiz

(Table) cp.hoops  
Comment:None  
Journaled:No  
Page Size:8K Pages:3 Overflow Pages:None  
Structure:HEAP  
Compression:None  
  
Key Field Type Null Default Comment  
sesh\_id INTEGER4 No None Session ID  
ntests INTEGER4 No None Number of puzzles completed  
tinstruct INGRESDATE No None Time the instructions were shown to the user  
tstart INGRESDATE No None Time the quiz was started  
tfinish INGRESDATE No None Time the quiz was finished  
tinsert INGRESDATE No 'now' Time the row was inserted into the database (default 'now')  
responses LONG VARCHAR No None JSON returned at end of quiz, to be parsed by backend  
duration1 INTEGER2 Yes None Time taken to answer puzzle  
puzzle1 INTEGER1 Yes None Puzzle chosen by algorithm  
elapsed1 INTEGER2 Yes None Cumulative time elapsed  
answer1 INTEGER1 Yes None Answer given by user  
correct1 INTEGER1 Yes None Correct answer  
...  
duration18 INTEGER2 Yes None Time taken to answer puzzle  
puzzle18 INTEGER1 Yes None Puzzle chosen by algorithm  
elapsed18 INTEGER2 Yes None Cumulative time elapsed  
answer18 INTEGER1 Yes None Answer given by user  
correct18 INTEGER1 Yes None Correct answer  
  
Secondary Indices:None  
Constraints:None  
Rules:None  
Grants:None

## Appendix

### Image details

intro1.png: PNG image data, 748 x 470  
intro2.png: PNG image data, 748 x 470  
intro3.png: PNG image data, 748 x 470  
intro4.png: PNG image data, 748 x 644  
intro5-orig.png: PNG image data, 748 x 723  
intro5.png: PNG image data, 748 x 487  
t32by1w.png: PNG image data, 748 x 291  
t32wy1b.png: PNG image data, 748 x 291  
t3bw21y.png: PNG image data, 748 x 291  
t3w2b1y.png: PNG image data, 748 x 291  
t3w2yb1.png: PNG image data, 748 x 291  
t3wb2y1.png: PNG image data, 748 x 291  
t3wy2b1.png: PNG image data, 748 x 291  
t3y2b1w.png: PNG image data, 748 x 291  
t3yb21w.png: PNG image data, 748 x 291  
t3ybw21.png: PNG image data, 748 x 291  
t3yw21b.png: PNG image data, 748 x 291  
t3yw2b1.png: PNG image data, 748 x 291  
t3ywb21.png: PNG image data, 748 x 291  
top-constant.png: PNG image data, 748 x 291