Ever since I bought my first camcorder back in 1992, I wanted to create animations (the camcorder was very large and it used VHS tapes, but it also had a single frame capability for capturing animations). Unfortunately, I never got around to using the camcorder for creating animations. But it planted a desire in my head. A few years later I got a copy of Toon Boom Studio. I did create animations with it, but I got sidetracked and never pursued it.

Fast-forward to a few months ago. I looked at the Toon Boom web site to see if there was a new version of Toon Boom Studio. I discovered that unfortunately it had reached its end-of-life and is no longer available. That’s when I decided to try its “Big Brother” - Toon Boom Harmony Premium (from now on I will just call it Harmony).

Harmony is a full-featured animation package that Hollywood animators have been using to create TV shows (like The Simpsons, Family Guy, South Park, Futurama, Sponge Bob Squarepants, and Bob’s Burgers) and full-fledged animated movies (like The Princess and The Frog, Star Wars: The Clone Wars, Pocahontas II, and The Lion King: Simba’s Pride). In fact, Disney has used it on quite a few of their 2D animation movies.

**Workflows**

Harmony lets you choose between three different workflows:

- **Traditional:** In the traditional workflow, some of the steps are done externally and Harmony is used for the digital portion. What this means is
the drawings are created on paper and then scanned into Harmony.

**Paperless:** In the Paperless workflow, all of the artwork is created digitally either from within Harmony using a pen and tablet or it can be created using another art program and then imported into Harmony.

Other than how the drawings are made, the rest of the steps between the Traditional and Paperless workflows are the same.

**Paperless example:** The sketches of the key mouse poses (in Figure 1) was drawn in Photoshop and imported into Harmony. Afterward I used tracing and various techniques to draw all of the “in-between” poses in Harmony.

Harmony has an “Onion Skinning” option where you can see one or more of your previous drawings at a time so you can compare the drawings to be sure that they are uniform in size and position. The Onion Skinning option will also let you see the next drawings as you move the playhead back and forth in the timeline. In the mouse screenshot (Figure 1), the current frame is the black mouse at the top of the arc, the red drawings are the previous drawings and the green are the next drawings.

**Cut-out:** In the Cut-out workflow the animator must breakdown the different parts of the final actor/person or creature. This means separating the body parts such as dividing the arms into three parts: upper arm, lower arm, hand (Figure 3 - left image). Once all of the body parts are separated, the actor needs to be rigged. This means reattaching (in a specific hierarchy) all of the body parts and placing pivot points at the joints. Then the animator can move the different parts of the actor or creature to animate the “puppet”.

**Cut-out Examples:** In my long-legged robot animation (Figure 2), I only had to draw a side view of its body and one leg set (I duplicated the right leg for the left leg and then moved it back in the Z axis (space) so it would appear behind the robot’s body). Then, I added three pivots to the legs (hip, knee, ankle) and the robot was ready to start walking. So the drawing process was very quick.

The linking and pivoting of the student robot (Figure 3) was a little more complex since it had more body parts to link and pivot. But since all it had to do was walk up to its teacher and offer the teacher an apple, I only had to draw one body angle/view. So it too was rather easy to setup.

**Comparison:** The Traditional and Paperless workflows are basically how the artwork gets into Harmony. It is the animator’s preference on which to use. The animator must also choose whether to utilize the frame-by-frame animation method or the Cut-out method of animation. If he will be...
using the frame-by-frame method, the animator must draw the complete images for the key and in-between frames. If he will be utilizing the Cut-out method he will only need to draw his actor’s main poses - forward, side, ¾, and back. Afterward all the animation is done by moving and rotating the body parts - no additional drawing is needed for your character or object. Which is better? It is a personal choice. At least Harmony lets you choose which works best for you.

First impression/steps
At first, I was a little intimidated with Harmony’s “Node” system/view (more about this later), but I decided to start watching the Toon Boom Harmony 12 video tutorials that were created by both Toon Boom Animation Inc. and third party instructors. These helped me create bouncing balls, jumping mice, etc. But I wanted written instructions that had step-by-step instructions where one set of instructions built upon the previous set until I knew how to use Harmony. Though there is an extensive Help file, I like printed manuals that I can flip through. So I looked for a printed Harmony manual. I found the “Animate to Harmony” book by Adam Phillips. It was written for the previous version of Harmony, but the author said that it could still be used to learn Harmony 12 (he even has a video on his web site telling the differences between the older and newer user interfaces). So I purchased the book. He was correct. I was able to learn around 80% of the options, etc. using it’s tutorials/exercises (though I did have to hunt for the new names or locations on a few options that had changed in the new version of Harmony). Why did I only learn 80%? Because space limitations prevented him from including step-by-step instructions for all of the 155 Effects and plug-ins (Figure 21) that come with Harmony. BTW: Effects are used for adding shading, lighting, deforming your artwork, making it rain, adding fire, etc. to your scene. I had to learn about them through the Harmony Help file and other 3rd party videos and tutorials. However, the 80% covered in the book was enough to give me a good understanding on how to use Harmony. So with this book, I was creating glowing/pulsating fireballs that arched through the sky, walking robots, falling snowflakes (with a 3D/depth effect that would spin and twirl the snowflakes as they fell), and lip-synced audio to my actors. It even demystified the “Node” system. So with the printed manual and Toon Boom Inc’s. Help Files (that filled in the holes or gave more in-depth instructions), I was able to learn how to use Toon Boom Harmony. I was quite pleased.

BTW: Using the book and Help Files was my way of learning - it may not be yours. Harmony’s Help file is quite thorough, plus there are quite a few video tutorials on the Toon Boom web site that may be just as helpful for you. In fact, I did go back and viewed them afterward to see if they mentioned something that wasn’t covered in the manual or I missed in the Help files - they did.

Since I too have space limitations with this review, I will not be able to cover all of Harmony’s options and effects. But I will try to cover as much as possible.
FYI: Harmony comes in three versions: Essentials, Advanced, and Premium. Essentials has the least amount of features and Premium has the most. This way you can choose which version best suits your needs and wallet. If you want to see the differences, there is a comparison chart listed on their web site which you can use to pick the perfect fit for your needs. And just so you know, this review covers the Premium version.

User Interface
As can be seen from the first screenshot (Figure 1), there are a lot of toolbars and tabs that surround the “Camera View”. Here is an explanation of a few of them:

**Toolbars**
- Advanced Animation toolbar: This contains the Scale, Translate, and Rotate tools which are needed to position your object and pivot points, and animate your images.
- Art Layer Toolbar: Drawings are divided between two
main layers: a Color layer and a Line layer. If you want, you can add two additional layers: Overlay and Underly. The Art Layer toolbar lets you quickly switch between the each layer.

- Deformation Toolbar: This contains the tools and options that are used to create a deformation rig, which lets you bend, reshape, and curve bitmap and vector drawings over a period of time.
- Easy Flipping toolbar: This gives you a slider-bar that lets you rapidly flip through your drawings.
- Workspace toolbar: Harmony comes with different workspace configurations: Default, Hand-drawing, Compositing, Animating, and Scripting. Each Workspace brings up a different set of tools that would be needed for the different steps of creating your animations. You can even create your own custom Workspace that contains the set of tools that you use most often. These Workspaces can be accessed from the Workspace toolbar's drop-down menu.
- Tools Toolbar: This contains all of the main tools that you would use while working in Harmony, e.g. the Selection, Contour, Brush, Pencil, Eraser, Paint, Text, Line, Dropper, Drawing Pivot, Morphing, Animate, Transform, Inverse Kinematics, and Show Onion Skin.

**Color View & Palettes**

The Color View is divided between Color Swatches at the bottom and the Scene Palettes at the top. When you first open a new Scene (document), you are given four colors: Black, White, Green, Red, and Blue. These are your starting colors. When you get to the coloring phase of your animation, you can then add additional Color Swatches to the list.

To keep everything organized, you can create and name additional “Scene Palettes” (color sets) for each of your actors/objects/backgrounds. This way you can call up the needed colors for the actor or object that you are currently coloring without the clutter of the unneeded colors for other actors, etc. You can also use the “Tint” window to create a variation of a color-set, such as the first set could be called “Larry daytime” and the second “Larry nighttime”. The Tint window can also be used just to change the coloring of something like changing this actor’s hair from blond to darker browns.

**Xsheet View**

An Xsheet (Exposure sheet) is a vertical table that breaks down the action, dialogue, and sound frame-by-frame (Figure 5). Each drawing layer in your scene has its own column in the Xsheet. Each column shows how long the exposure of each drawing lasts. This is represented by a vertical line drawn between the frames. In my Metronome’s Xsheet screenshot (Figure 5), you will notice that there is a long vertical line in both the Metronome base and the

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Figure 7. Rather than having to create a whole new set of colors to represent nighttime colors, all you have to do is duplicate a currently used color(s) and use the Tint window to tint them darker. The Tint window can also be used just to change the coloring of something like changing this actor’s hair from blond to darker browns.

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Figure 8. In addition to the Camera and Drawing views, there is also a Node view (shown on the left). Each layer, Peg, Effect, etc. is represented by a colored rectangle. Each Node is attached to another in a certain hierarchy. All Nodes end up attached to the Composite node and this is attached to the Write and Display Nodes (used to print or view your scene). BTW: At first the Node view may seem intimidating, but after a while you get the hang of linking and using the Nodes. To help us understand the Node view, the Toon Boom help file likens it to all the parts needed to create a sandwich.

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Figure 9. The Glow around this fireball was quickly applied by attaching a Glow effect to its layer/node. This is much quicker than drawing it by hand.
Figure 10. Harmony has a Volume effect that will turn your 2D image into a 3D image (by adding volume and beveling the edges). Once you have added volume to your image, Harmony’s lighting tools can cast lights and shadows on your actor or object. Notice in the right image, lighting now appears along the left side of the tiger’s body.

Figure 11. You can view the light source. By dragging the “Position” of the Light or the “Target” of the light, you can change the direction of the light. You can also change the color of the light, - change it to yellow to make it look like the actor is standing in the setting sun.

Metronome arm columns. This is because I only drew the Metronome’s base and arm once. I then used three keyframes to make the arm swing back and forth.

The Xsheet view also has a Functions section that has columns which displays in numerical form the motion, rotation, or effect that you applied to a drawing layer. In the Metronome Xsheet screenshot (on the right side of Figure 5) you will see that it lists the Angles of the Metronome’s arm as it swings back and forth. It also shows small black squares in two frames. These are two of the three keyframes that I placed in the timeline.

Views

Harmony gives the animator several ways to view the scene being created:

- Camera View: You can draw, paint, animate, create animation paths, and see the results in the Camera View. It contains a top and a bottom toolbar with tools that let you navigate in the view, change the display mode, etc. It also contains buttons for things like the “Light Table” - this fades the the colors of all the layers except the one you are currently drawing on. This makes it easier to see the drawing that you are currently editing. Other buttons let you create Masks, Show or hide the TV Safe Area, Zoom the View, use the OpenGL Mode (a less memory intensive way of viewing your animation), or use the Render View Mode (this switches the Camera view to a fully rendered display showing the final image of the current frame).

- Drawing View: Though you can draw in either the Camera or the Drawing View, they differ in that in the Drawing View, you only see the drawing on the selected layer verses the Camera View that shows the images drawn on all layers (for that frame).

- Top and Side views: These are helpful for Multiplane scenes where you want to position elements in 3D space. These views contain a V shape representing the camera’s field of view. Inside the field of view are horizontal lines - one for each object/layer in the scene, e.g. background, actor,

Figure 12. Harmony lets you draw with both Bitmap and Vector brushes. Each style has a different set of brushes and the appropriate brushes show up when you click on a Vector or a Bitmap layer (that you previously made). The two screenshots on the left show the Bitmap tips and some of the Bitmap brushes, the third screenshot shows some of the Vector brushes, and the fourth screenshot shows the textures that can be applied to either set of brushes.
objects, etc. (Figure 6 left image). Clicking on the thumbnails (along the left side of the views) highlights its corresponding horizontal line within the field of view. After clicking on one of the thumbnails and selecting the “Translate” tool, you can move the item around in the 3D space.

- Perspective View: The Perspective view lets you rotate the scene through all possible angles to see the spacing between the elements (Figure 6 - right image). Though you can’t actually grab each element and move it like in the top and side views, you can move their location by changing the X, Y, Z axis parameters in the Layer properties window.

Shift and Trace

When you are hand drawing your frame-by-frame animation, it is very important to keep all of the proportions of your actor or object uniform. Harmony’s Shift and Trace feature lets you temporarily move a drawing so you can trace it in a slightly different location in the scene. The shifted drawing can also be rotated and scaled to help with the motion of the animation.

Bitmap Brushes and Bitmap layers

Before you can start drawing in Harmony, you must specify (for each layer that you add) the type of layer it will be: Vector, Bitmap, or a combination of both (the lines can be Bitmap and the colors can be Vector or vice versa). The available brushes are different between the the two modes (Figure 12). What is similar between the two modes is that the same Textures can be applied to both mode’s brush strokes.

Many but not all of the drawing tools are available when you are working on a Bitmap layer. The unavailable tools will be greyed out.

Morph

In the traditional hand drawn (frame-by-frame) animation method, the animator spends a lot of time drawing the in-between drawings for the key poses so the flying bird, running animal, rising smoke or falling water’s movement looks fluid. This is time-consuming. To help lessen the load,
Harmony comes with a morphing feature that creates computer-generated drawings and places them between your vector drawings which greatly speeds up the process.

A simple example of morphing is creating a square in one frame and 10 - 20 frames later you draw a circle. You can then instruct Harmony to create a morph. Instantly it creates all of the in-betweens so when you play the sequence, you see the square gradually turn into a circle.

Light Shading

Animations would look uninteresting if there were no shadows/tone or highlighting added to it. This would be another time consuming job if you added it manually, frame-by-frame. Harmony takes the grunt work out of creating tone and highlighting.

Since Harmony can’t do anything to your flat 2D images, it gives you tools to add volume and bevels to your images. Afterward you can carve and emboss areas using color zones within the volumes. This gives your image “3D geometry” (Figure 10).

Once your image has its 3D geometry, you can add a light source and the appropriate highlighting and shadows will be created. One nice thing is that once you create the 3D geometry, you don’t have to do any other tweaking to it, even if you move the location of your light source. All of the highlighting and shadows will update and appear perfectly.

Light types

Like mentioned in the Light Shading heading, you can add one or more light sources to your scene. These light sources can be viewed as physical representations - they look like a small rectangle with a lens that has a long line extending from it (Figure 11). Once they are visible, you can manually reposition the “Source” and “Target” locations. In the Figure 11 top screenshot, the light source is sitting off the the left of the tiger and the target points to the left side of the tiger’s head and the reverse for the bottom screenshot.

There are many parameters that can be set for each light, including the Cone Angle, Diffusion of the light, the Light Intensity, the Surface Reflectivity, and the Light Color. There are also three “Light Types” that you can use:

- Directional Light: Each beam of light follows the direction defined by the light source and target, and points in the same direction. This type of light is used when the light source is far away or very big, like the sun.
- Point: This is a light that illuminates everything around it. Its beam of light will go in all directions like a fire.
- Spot: This light forms a conical shape like a flashlight.

Pegs and Trajectories (Motion paths)

One of the ways to move your object is to add a peg to it and create a motion path for the peg. So once the peg is linked to your actor or object, they will follow the path that you create for the peg. You can display the motion path so you can tweak it. It will appear as a long line with two Key-frames - start and end. By adding a Control Point to the center of the motion path and then raising it, you can create an arching path/trajectory that would be useful for items (like a fireball) that are thrown or shot out of a cannon (Figure 20 - top image). You can add Control Points so you can reshape the path (like seen in the bottom image of Figure 20. BTW: this is an top view screenshot). So you can have your actor move up, down, horizontally, or in a circular motion. You can use the circular path (for example) to make your actor weave in front of and behind objects to get a 3D
**Silicon Summit**

Effect.

Pegs also let you scale, resize, rotate all attached layers or parts of your drawing at once. No need to resize every part of your actor individually.

**Nodes**

In addition the the Draw, Camera, Perspective, Top, and Side views, there is a Node view (Figure 8). Each layer, Peg, Effect, etc. is represented by a colored rectangle/Node. Each Node is attached to another in a certain hierarchy creating a Node system. All Nodes end up attached to the Composite Node and this is attached to the Write and Display Nodes (used to print or view your scene). Nodes allow you to add extra elements and effects, and to move beyond the possibilities offered by the Timeline and Xsheet views.

The Node view is useful for rigging puppets (cut-out animation), creating advance effects (like making it rain), and having a clear view of complex scenes. The organization and order of the Nodes determines the flow of data during the compositing process and how your animation elements will be composited.

**Cameras**

Using Pegs and motion paths, the camera can be animated just like any other element. This way you can (in one example) make it look like the camera is moving through different layers of trees and shrubs in a forest until it reaches a campsite and focuses in on the person cooking his meal.

Since you are creating 2D drawings which look flat from the side, you can add a Ortholock layer to a set built in 3D. The Ortholock forces your drawing layer (that contains your actor or object) to always follow the Camera angle, meaning the character or object will rotate to always face forward (the camera’s view point).

**Lip-sync**

Harmony lets you import audio to be used for lip-syncing. But rather than simple “Muppet style” talking with the mouth only opening and closing, Harmony lets you create mouth shapes to match the words or phonemes (a set of speech sounds) being spoken. You can create the mouth shapes (Figure 13) and manually add them to your actor frame-by-frame, or you can let Harmony add them for you. Harmony recognizes nine different phonemes or mouth shapes grouped by the letters of the alphabet (A - G & X): A: m, b, p, h  B: s, d, j, i, k, t  C: e, a  D: A, E  E: o  F: u, oo  G: f, ph  X: Silence, undetermined sound.

The Help file gives example mouth shapes to match each grouping, e.g. the lips would be closed for the sounds of m, b, p, and h. As long as you match those mouth shapes for your actor and then link each drawing to the appropriate sound in Harmony's Lip-Sync Mapping window, (Figure 14) Harmony will analyze the audio and place the appropriate mouth shape in the timeline. Of course nothing is ever perfect, so if an occasional mouth shape is incorrect, you can replace the shape(s) afterward using the Drawing Substitution window (Figure 15).

The Sound Element Editor (Figure 16) can also be used to change individual mouth shapes, but it doesn’t stop there. It also has options that let you specify which frame the imported audio (whether for lip-syncing or just background audio) is to start and end on. There is even a line in the waveform that you can make go up and down to increase and decrease the volume level.

As a side note, I was curious to see if I could bring in a short animation that I created in Figure 21. Once you complete your animation, you can add effects such as blurs, glows, Chroma-Keying, etc. to your project. Harmony comes with a library of 155 effects and plug-ins that you can apply.
CrayTalk of a talking girl (Figure 17). Would the lip-sync hold true once imported? Well I saved the animation as a series of images and I brought them in to Harmony in one fell-swoop - they were automatically placed in consecutive frames in the timeline. Then, I brought in the audio - it was placed on a separate layer. When I played the animation, the girl's lips synced perfectly. What this tells me is that if you have previously created lip-synced animation in other programs, you can incorporate them in your current project in Harmony.

Particle Effects
Harmony's Particle Effects help you quickly create atmospheric effects, such as rain, grass, fire, or more complex systems, such as swarms of animated insects. Other Particle Effects let you set the parameters for things like the particle's Gravity, Velocity, Randomness, Wind-Friction (the amount of wind in the scene), Orbit (defines the axis the particles will be attracted to), etc. You can even add Explosion effects to your particles to simulate fireworks or exploding bombs.

OpenFX
Harmony supports the OpenFX standard used to create visual effect plug-ins. So 3rd party OpenFX plug-ins like GenArts' Sapphire package can be used in Harmony. BTW: If you are interested, some OpenFX plug-ins are application specific. So do your research on any other 3rd party OpenFX plug-ins to be sure they are completely compatible with Harmony before buying them.

Importing 3D images
Though Harmony is a 2D animation package, it does let you bring in 3D objects with one caveat: Harmony does not render 3D objects, so it must be able to link to Maya so Maya can render the 3D objects. But as you can see from the Figure 18 screenshots, you can still bring in your 3D models and then trace them to get correctly proportioned 2D versions. Imported 3D objects (whether they are linked to Maya or not), retain their 3D properties, so you can rotate them to make them fit better in your scene or to be able to trace different angles (Figure 19).

Being able to bring 3D objects into Harmony is a boon for people that are better at drawing organic things than technical things like cars, planes, or construction equipment. If you look on the Internet, you can find all sorts of free 3D models that you can download and trace in Harmony. BTW: On the flip side, if you are more technical, you can bring in organic 3D models like animals, people, etc. and trace over them too.

FYI: Harmony will import these 3D formats: FBX, 3DS, OBJ, OSB Alembic (*.abc), and Collada (*.dae).

Gaming Export
In addition to creating animations for TV, movies, or the Web, Harmony can also be used to create animations for games - whether it's for Mac, Windows, Mobile, iOS, XBOX, etc. There are two main pipelines for exporting data from Harmony to your game engine: Raw Game Data Export and Frame-by-Frame Export. Each have their advantages and disadvantages. In short one way creates smaller files than the other which is better for mobile applications. I won't go into detail on this since I don't create animations for games. But there is documentation on both pipelines listed in the Harmony Help files.

The Skinny

Evaluation: Harmony Premium is a complex tool that will take a bit of time to learn all of its features, but it is well worth the effort. You can create amazing animations using all of its tools and effects. I like that Harmony supports both the Traditional frame-by-frame drawings or Cut-out animation styles. This way you can find the style that suits you best or even combine the styles. I can't wait to see the animations that I can create using this program. I would highly recommend it to any serious animator. And for the hobbyist that doesn't have deep pockets, the Harmony Essentials or Advanced version may not have quite as many options, but they have enough to fill any animation needs you may have. If you are interested, I suggest you download the trial copy and take Harmony for a test-run.

Requires: Mac OS X 10.9.5 - 10.10.x, Monitor: Minimum 1280 x 800 - Optimized for 1920 x 1080 or higher; Memory: Minimum 4 GB (slow), 8 GB (faster) 16 GB (really fast); (Optional) A drawing tablet like the Wacom Intuos or Cintiq for precise drawing. For video card or Windows requirements - go to the Harmony System Requirements web page.

Company: Toon Boom Animation Inc.

Price:

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Available trial copy: