

# BlockParty 2: Visual Procedural Rigging for Film, TV, and Games

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Figure 1. The BlockParty 2 visual rigging interface for four characters: a biped, a spider, a car, and a horse.

## 1. Introduction

At Lucasfilm, riggers create thousands of rigs each year to support films, television shows, and video games. These rigs vary greatly in complexity and type, ranging from simple props to giant multi-limbed creatures. *BlockParty 2* (BP2), a new Maya-based procedural rigging system named after its predecessor [Smith and White 2006], allows expert and novice riggers to build sharable rigs visually using expertly-designed rig pieces.

BP2 has two defining characteristics that make it uniquely well-suited for Lucasfilm's varied rigging needs:

- Rig pieces establish contracts that describe what information is needed from the Maya scene and how other rig pieces can be connected; enforcement of these contracts makes rig pieces flexible for many use cases.
- Rig pieces are presented in a discoverable, user-friendly UI for visually constructing, customizing, and reproducing rigs.

## 2. Contractual Block Design

BP2 is built around the concept of a *block*, or a rig piece that has a high-level purpose (e.g. an arm or hinge). Blocks can be self-contained in that they work without other blocks (e.g. a finger), or they can be an add-on block that extends existing blocks (e.g. a block that adds a twist rig to joints from another block). Multiple blocks can be connected and exported to create a *compound block* (e.g. a full limb or an entire character); compound blocks can be used to create new rigs just like other blocks. The challenge is to make each block in the system as reusable as possible.

The key to the flexibility of the blocks in BP2 is that the system provides standardized mechanisms for connecting them. Block connections come in two forms: plug/socket connections (a concept expanded upon from the original BlockParty system) and hook/handle connections. When a plug from one block is connected to a socket on another, a parenting relationship is formed in the rig. Similarly, blocks can expose specific Maya nodes as handles; when a hook is connected to a handle, the block with the hook gains access to the exposed node. While plugs and hooks are often designed to be paired with specific sockets and handles, respectively, the BP2 system enforces the contractual obligation between any two connected blocks; this standardization of interactions allows any block to be connected to any other. For instance, a hind-leg's plug can be connected to a clavicle's socket to create a clavicle-leg; or a double-jointed knee hook can be connected to an elbow joint to create a double-jointed elbow.

Another way that BP2 encourages reuse is by limiting which nodes are accessible in the existing Maya scene. Each block advertises a list of required *signposts*, or 3D positions, orientations, and/or scale values that the block needs in order to place Maya nodes during rigging (e.g. signposts for a spine include the positions at the bottom and top of the spine). BP2

passes only this information from the Maya scene to the block when rigging occurs. The end result is that blocks can be more easily re-purposed by assigning and repositioning signposts.

## 3. Visual Rig Construction

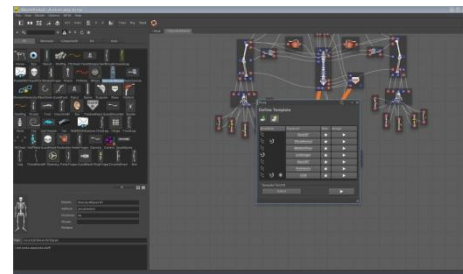


Figure 2. BlockParty 2 User-Interface. Left: Library of available blocks. Right: In-place signpost assignment panel.

Since Lucasfilm produces so many rigs, it is important that the rigging interface for BP2 be intuitive for riggers and non-riggers. So, unlike other procedural rigging systems, rigging in BP2 is achieved via a visual, 2D interface. The UI allows users to easily instantiate blocks by dragging them from a block library onto a canvas and connecting them visually (see Figure 1). A user modifies settings in-place for each block by expanding the block's visual representation in the UI; this expanded view of a block includes several task-specific panels. For instance, one panel allows a user to assign required signposts for a block to existing nodes in the Maya scene; the panel can also import a template for all of the required signposts that can be resized/repositioned in the 3D view using Maya's normal transformation tools (see Figure 2). This visual approach to procedural rigging allows riggers of all skill levels to spend more time conceptually designing a rig and less time navigating nodes in the Maya scene or scripting.

The BP2 UI presents users with available blocks in a simple to navigate library panel (see Figure 2). Tagged blocks from all of Lucasfilm are submitted to the same database. The library comes with a number of predefined, filtered views of the tagged blocks in the system, but users can also create customized views for specific production needs or personal preference.

The BP2 system has proven to scale well across a wide variety of rig complexities. Props, bipeds, multi-limbed creatures, and mechanical characters have all been created with BP2. At Lucasfilm, the ease-of-use and flexibility of BP2 has swiftly led to its adoption for films, television shows, and video games.

## References

- SMITH, J., AND WHITE, J. 2006. BlockParty: Modular Rigging Encoded in a Geometric Volume. In *ACM SIGGRAPH 2006 Sketches (SIGGRAPH '06)*, Article 115. ACM, New York, NY.