

Visualizing the Production Process of “Encanto” with the Command Center

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Figure 1: A preview of the Command Center web interface.

ABSTRACT

Walt Disney Animation Studios presents the Command Center, a web application for communicating and monitoring high dimensional production metrics at the studio. Developed and utilized during the production of “Encanto”, the Command Center provides near-real time insights into render performance metrics, department staffing, completion data, and film production progression statistics, all integrated into a singular novel film interface. The source data is collated into multiple “buckets” of aggregation, allowing observation at high, medium, and low levels of granularity. Since its inauguration on “Encanto”, the Command Center has grown in adoption among several new productions and has shifted our studio’s direction and perception of collecting and monitoring our production metrics.

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1 INTRODUCTION

Producing an animated feature film at Walt Disney Animation Studios is a collaborative effort amongst many groups, each depending on a wide array of production tracking, data management, and rendering software along the production pipeline to perform their respective tasks. Ensuring the success of the production requires an ability to monitor the overall health of the pipeline and production process and identify problems that may arise [Palmer et al. 2019]. Since our pipeline has evolved significantly in the past few years with the adoption of Universal Scene Description (USD), there was an increased desire to track and monitor the performance of our pipeline and overall statuses of our productions at a more holistic level. Our existing systems for inspecting pipeline and production metrics previously only provided focused views into highly granular data.

To address the need for global observability, a new system designed to collect and visualize production metrics was constructed and utilized during production of “Encanto”. We designed and developed a novel film interface that represents the entirety of the film as a high dimensional artifact, and combined it with a custom-tailored data visualization framework. We packaged both into a web-based

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interactive dashboard, delivering near real-time metrics and insights on our productions. This new system, called the Command Center, is architecturally designed as a modern web application, and is comprised of a React-based client-side component and a Node.js server-side component. The Command Center evolved to become a critical component of “Encanto”’s technical production leadership’s toolset and has begun to shift our studio’s culture regarding metrics collection and visualization methodologies.

2 APPROACH

2.1 Client-side and the Film Artifact

The Command Server operates on the React frontend framework, and uses the D3.js library for drawing its dynamic, interactive visualizations.

The *film artifact*, referred to as the Timeline View, is a graphical interface visualizing every shot and the production tasks of an entire feature film. Production tasks for each shot are plotted as stacks of rectangles (2a), sorted in production order, and aligned in a horizontal line that represents the current state of the film (2b). On “Encanto” the Timeline View was comprised of over 1,500 shots, each with an average of 20 production tasks, collectively forming a grand total of over 30,000 production tasks visualized altogether.

We plot aggregated shot metrics (section 2.2) in graphs below the Timeline View; we refer to the aggregated shot metric graphs as Shot Data Graphs. Some examples of data we graph include render times, render memory usage, and production support tickets. By stacking these graphs below the Timeline View, we can view key performance metrics for every shot in a film on a single screen.

Access to sequence, shot, and frame-specific data is directly accessible by clicking on slices in the Timeline View, opening new focused versions of the Timeline View and respective Shot or Frame Data Graphs.

The Command Center includes a crew-focused view, called the Process View, that shows every artist and crew member staffed on the film. This interface graphically displays a breakdown of per-department statistics such as people, inventory, and issues, all within a single visual team artifact. Similar to the Timeline View, the

Process View also provides the ability to drill down into particular departments, and can display per-team staffing, completion graphs, and other additional data widgets.

2.2 Server-side Data Pipeline

The visualizations seen in the Command Center present a culmination of metrics derived from multiple data silos across the studio. To retrieve the data driving these visuals, the back-end web server for the Command Center performs a series of data extractions, transformations, and caching, operating as a micro-ETL (Extract, Transform, Load) pipeline.

The Command Center back-end server uses the Express back-end framework for Node.js, and is configured to extract data at scheduled time intervals from multiple sources. Some of these sources include our production tracking services, render farm metrics databases, and production casting databases. After collection, the data must be cleaned, joined, and aggregated into distinct buckets of granularity (e.g. per sequence, shot, frame). We then cache this data into a Redis instance and serve the cached data from our REST endpoints. By avoiding the costly process of collecting and transforming the data on every backend query, this system architecture results in fast API responses and near-real time metrics.

3 RESULTS

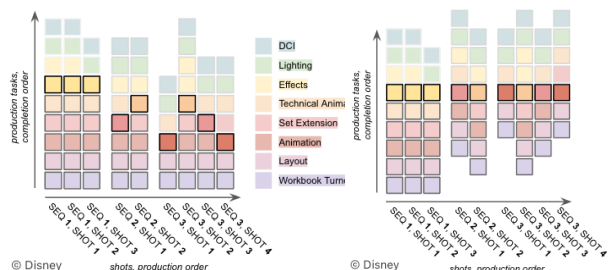
Usage of the Command Center started during early shot production on “Encanto” with the film’s VFX Supervisor and Technical Supervisor as primary stakeholders, and later expanded to department supervisors and Technical Directors. Within days of the Command Center’s initial release, our stakeholders integrated it directly into their daily work. By using the Command Center as their film production global health dashboard, our users recognized problems and identified their causes faster than before. Many began utilizing the Command Center as their one-stop application for current production and team information. Anecdotally, stakeholders reported a wider awareness of the state of the production and stronger visual familiarity with the film.

4 CONCLUSIONS AND FUTURE WORK

Since the conclusion of “Encanto”’s production, the Command Center has been embraced by other production projects as a critical means of monitoring project health. Through its wide adoption, the Command Center has sparked new discussions within Disney Animation on metrics, data collection & processing, and data visualization. For future work, we are investigating methods of optimizing the frontend rendering performance. Additionally, we are particularly excited to expand our data sources and levels of data aggregation beyond the current schemas, and provide context and answers to more questions posed by our future productions.

REFERENCES

Sean Palmer, Kaori Ogino, Aidan Sarsfield, Munira Tayabji, Mark Hills, Renee Tam, Pavani Rao Boddapati, and Claudia Chung Sanii. 2019. Predictive and Proactive Pipelines: Approaches to Monitoring and Optimizing CG Film Production. In *ACM SIGGRAPH 2019 Panels (SIGGRAPH '19)*. Association for Computing Machinery, New York, NY, USA, Article 3, 2 pages. <https://doi.org/10.1145/3306212.3328118>



(a) Shot slices listed horizontally along the production axis, composed of tasks sorted vertically by their completion order. Latest completed tasks are outlined in black.

(b) Shot slices shifted vertically to align their latest completed tasks, forming a horizontal line representing the current state of the film.

Figure 2: Film Artifact structure.