Collaborative Multitouch Log Browsing

[Extended Abstract]

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ABSTRACT

System logs contain much information that can assist system administrators in monitoring the state and history of system services. Tools and alarms that analyze such logs, however, are designed to emphasize certain patterns, and therefore make it difficult to detect novel problems or attacks. In this paper we describe a multitouch visualization environment to facilitate situational awareness of log data. By supporting administrators in identifying emergent patterns, we leverage the same skills they currently apply to crude text commands. Moreover large multitouch displays allow the environment to act as an information radiator and support collaborative exploration.

Categories and Subject Descriptors

H5.2 [**Information interfaces and presentation**]: User Interfaces–Graphical user interfaces; K.6.5 [**Management of Computing and Information Systems**]: Security and Protection

Keywords

Log visualization, Multitouch interaction, System administration

1. INTRODUCTION

The apparent simplicity of web server logs conceals a challenging complexity of events. While many system administrators are experts at drilling into logs with simple textual tools and with languages like *awk* and *sed*, new technologies may support interaction that affords new benefits.

With the coming availability of large and affordable multitouch displays we are offered an opportunity to revisit visual languages in the exploration of data. We expect the use of touch will foster an *actual* rather than simply metaphorical sense of data manipulation and we hope that this immediacy will invite greater exploration. This capability will also improve communication of discoveries to a broad range of stakeholders.

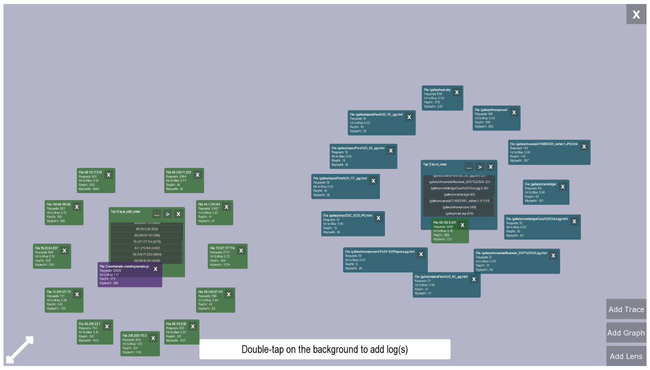

Figure 1: Expanding by IP then by URL.

Visualization has been used for system management for some time. Web traffic performance and e-commerce site usage have been common subjects (e.g. WebViz[7]), and other systems have supported security tasks such as intrusion detection [5]. Our emphasis is on situational awareness rather than supporting specific intentional tasks. In particular, we are motivated by Cockburn's idea for team-room *information radiators* [3], together with the direct manipulation potential in demonstrated in *starfields* [1], and leveraging co-located collaborative inspection [8]. Our goal is to develop a platform for design and usability research using this approach.

Cockburn describes an information radiator as *"information in a place where passersby can see it."* [3] (p.114) and can take many forms, such as a frequently updated poster in a high traffic hallway. What is of particular interest is the change of status. When considering security questions, allowing idle manipulation of an ever-present status display may set in motion creative forms of speculation. Cockburn's approach is used in Agile software development where this collaborative speculation leads to novel solutions well aligned to the needs of the domain.

2. DESCRIPTION

We a developing a prototype log browsing tool (see screenshot Figure 1) using PyMT[4]. The design assumes the availability of a large work surface. We are using a multitouch display assembled from low-cost components using a diffuse illumination design, but our design and implementation also

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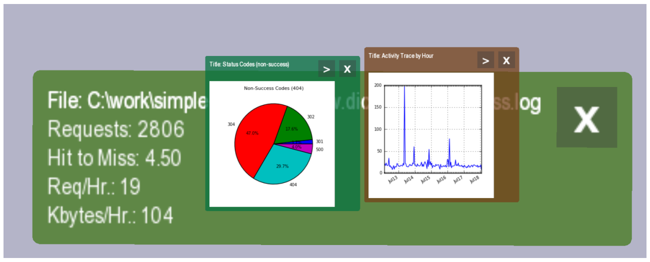


File: C:\work\simple v.di ss.log
Requests: 2806
Hit to Miss: 4.50
Req/Hr.: 19
Kbytes/Hr.: 104

Figure 2: Graphical view.

work with the flat wall-mounted displays that are becoming available.

PyMT supports input from a number of multitouch sources including TUIO, trackpad, and touchscreen HID devices. That made it a perfect fit for our target platform and also allowed for development and testing using other devices. Being Python-based, PyMT yielded the expected benefits of platform independence, rapid development turnaround, and a rich selection of extension packages. For a graphing extension we chose matplotlib. For statistics were are exploring scipy and rPy.

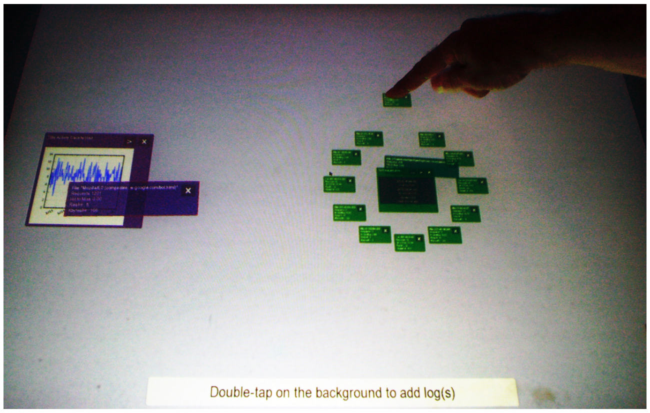
Users may open historical logs from the file system and these logs appear as semi-opaque rectangular objects showing basic descriptions in text. Each object on the desktop is easily moved, rotated, and resized using simple touch gestures and the workspace supports simultaneous scaling of all objects. Inspection of objects is performed with configurable lenses[2]. With very few such tools the user is capable of navigating, filtering, aggregating, and graphing multiple data sources.

As an example of a session, in figure 1 the user has opened a single log, shown in purple. They then hovered over the log with a lens configured for IP address index and clicked *expand* to create the green cluster of top-12 requesters by IP. They then took the most active IP address out of the cluster and moved it right to be used with a lens configured for URL. The rightmost grouping shows the top-12 resources requested by the top IP address from the first "query". Note: the lens is capable of interrogating the data for available indices and users can cycle through these indices for further expansion.

Having segmented the data into meaningful subsets, the user might then display the resulting objects using the graph tool. Figure 2 shows two views of the same underlying log container. Note that if the graphing lenses were superimposed over a stack of log objects, the union of the datasets would be presented in the graphs.

3. DISCUSSION AND CONCLUSIONS

We find that with few tools there is still remarkable flexibility in this system. Large sets of data can be sliced into smaller ones and then these in turn can be easily joined with other subsets for graphing. Without use of any kind of query language, we quickly found the most active resources on a web site for the previous week, filtered out the search-bot traffic (the IP addresses were consistent with the agent), and then saw that the most active requester was posting comments to a particular gallery. We could also see that the search bots were a reasonable burden on the limited bandwidth of the hobby site, that one specific PHP application generated the majority of site errors, and that there were some surprising geographical centres of interest.



Double-tap on the background to add log(s)

Figure 3: Live session.

While none of this is beyond a system administrator or DBA the interesting feature was that no scripting or coding was required. Moreover, we have found that the large display and the multitouch capability compels and rewards exploration. Even more encouraging is that the technology appears to encourage and support collaborative inspection in the way we had hoped.

In terms of future work, we are interested in the potential for reuse and sharing of discovered data patterns and so we will seek to codify the query implied by a user's manipulations, creating what Nardi[6] refers to as a visual formalism. We are also interested in giving some lenses more sophisticated statistical and data mining capabilities with the use of plug-ins. Finally we will be designing a default view for real-time data for use as a proper information radiator.

4. ACKNOWLEDGMENTS

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