



Fractal Conceptual Prototype: Active Behaviors

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Abstract:

Fractal is a research project that seeks to develop on-demand content management as a service, specialising in helping users in different organisations to collaborate. This report describes part of our conceptual prototype, a working system developed to help clarify our vision and understand today's content management platforms. It demonstrates the key ideas of a multi-tenanted content management service that is extensible and allows rapid adoption and customisation. This report introduces the idea of Active Behaviors, a technology that allows users to add and compose functionality for content processing, viewing, managing human tasks or interacting with other cloud services.

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This report and its accompanying video [1] introduce the concept of Active Behaviors within Fractal, a research project seeking to develop a heavily customizable content management service for HP. Active behaviors are a mechanism for extending a content management system with new functionality that can respond to user activities, changes to content or other events. This functionality may coordinate human tasks with automated processing tasks performed by other cloud-based services, reducing the amount of repetitive manual tasks for a user. End users can add active behaviors to the content management service within a workspace belonging to a team, project, or task, known as a *Content Space*[4]. By accessing this functionality from the context where content is stored and managed, users need not move content manually between applications and services they wish to apply to it, so content management and security policies can be enforced.

To visualize some of our ideas and identify technical challenges around topics such as active behaviors we constructed the conceptual prototype featured in this report and the accompanying video. The prototype is not a real, finished version of Fractal, but it demonstrates the key ideas of a multi-tenanted content management service that is extensible using active behaviors, allowing rapid adoption and customization by end users. This report describes an example active behavior from the point of view of an end user, showing how business users can incorporate active behaviors into everyday project work. The accompanying video provides a similar explanation with a screencast of the demonstration [1].

Additional Materials

In [2] we discuss the technology used to produce the conceptual prototype, which was based around current technologies. Here we also give reasons why cloud-based content management services require entirely new technologies.

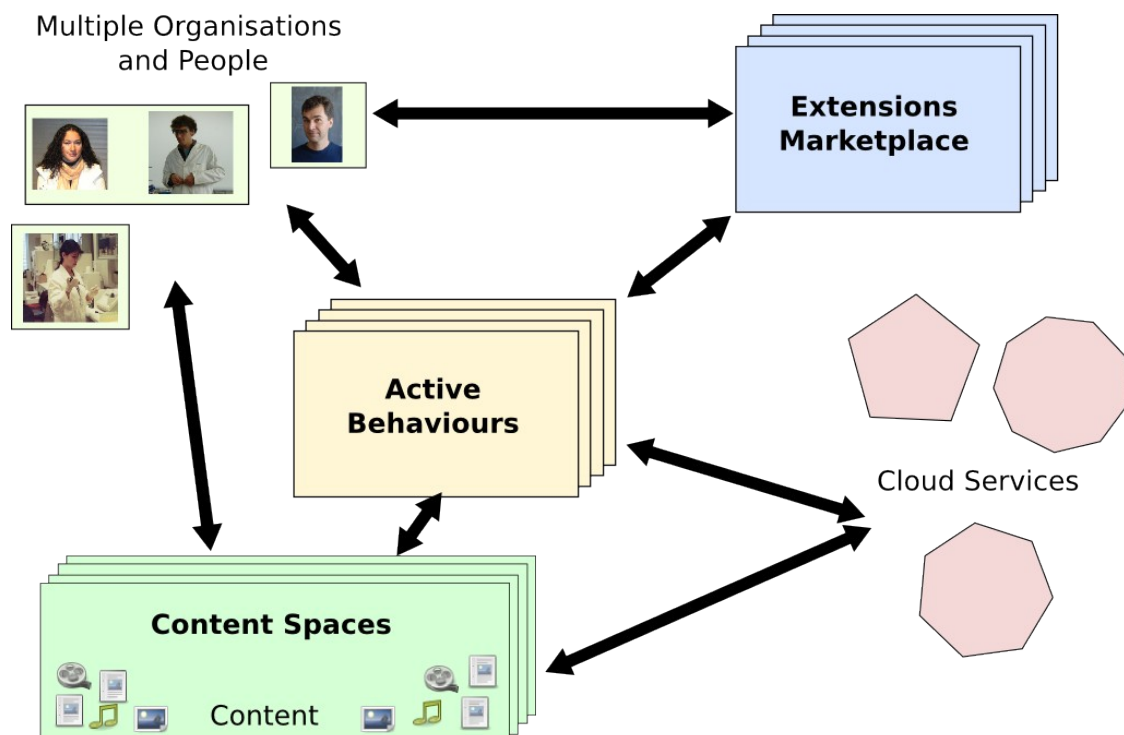


Figure 1: Core parts of Fractal and their relationships

The conceptual prototype visualizes several key ideas in Fractal. Besides active behaviors, we explored content spaces [4] and the *extensions marketplace* [5], a service used to exchange and discuss extensions such as active behaviors. Figure 1 illustrates the high-level connections between these components. In [3] we expose our vision of the whole of Fractal and reviews relevant literature and technical challenges.

Active Behaviors

Active behaviors is a technology that can be used to construct using complex applications as well as simple, automatic rules that do not present a user interface. Services provided by Fractal or third parties in the cloud can be composed together to create new functionality using simple reactive rules or complex workflows. Graphical authoring tools will in future allow developers and business users alike to easily write content rich applications that leverage the social graph of users within content spaces. Fractal will provide the engine to run and coordinate active behaviors, which expose a programmable Web platform with extensive open APIs for managing content, messaging and task assignment. The active behaviors engine and authoring tools will make it convenient to "attach" new functionality to content, rather than moving content manually between services.

We now demonstrate how a user could make use of an active behavior by walking through an example scenario. This is the same example discussed in the accompanying video.

The Scenario

Phil is a research manager in a large pharmaceutical company called Big Pharma. He is coordinating the UTS Alpha project (figure 1) involving several organizations, including ABC Research. Phil coordinates the outsourced teams, working directly with Sarah Horrocks, a lead researcher from ABC research. Phil must communicate the UTS Alpha project progress and results to the advisory board. Catherine Douglas sits on the board. Phil uses the progress report application running in Fractal to automate the production of the report.



Figure 2: Team members in our example scenario, the UTS-Alpha project

The progress report application is a fully functional example – created by us as part of the prototype - of the type of application that Fractal users create by writing an active behavior and corresponding

user interface component. These two pieces were packaged as an application and distributed using the Fractal Extensions Marketplace [5].

Running the Application

Here we describe the functionality that the Progress Report Application provides, and how it integrates tightly with the UTS-Alpha content space.

Phil launches a "one-off progress report" for the month of November. Fractal provides an API for applications to access information about the users in content spaces. Using this API, the progress report application populates a list of participants based on their roles. Here, Sarah Horrocks and another colleague are automatically assigned the role of contributors, while Catherine Douglas and another advisory board member are selected as reviewers.

Now the application is running, Phil uses the Progress Report Dashlet to check how things are shaping up. The dashlet links to a dialog that shows tasks assigned to members of the space. In this case Phil can see that both Sarah and Martin have been given tasks to provide their input for the monthly report.

Via the document management API, Fractal enables the application to create skeleton document fragments for each participant. Those documents are used to collect input from each of the contributors.

Now we move to the perspective of Sarah Horrocks, Phil's colleague from ABC research. Sarah logs into Fractal using her favorite web browser. The My Tasks dashlet shows that she has been asked to provide input for this month. Fractal makes it easy for the developer of the progress report application to create tasks and assign them to users. Sarah can provide here input on-line, directly from her web browser, using a rich text editor. She saves her current input as a draft to come back to it later.

Built in the application workflow is a timer to remind all contributors when their input is due. The application uses the Fractal messaging API to notify users that their work is due. If the deadline approaches and Sarah has not published the final version of her report, a reminder email is sent. Sarah has opted to be contacted by email, but other users could have selected an instant messaging application such as Pidgin or Twitter.

After Sarah logs back in and uses the rich text editor to submit the final version of her report for Phil to review, the dashlet will show that here task has been completed.

Now, Phil has been automatically assigned a task to review Sarah's input in preparation for the advisory board meeting. He uses a similar rich text editor to the one Sarah used to review her input and add comments for the board members.

Mixing Automated and Human Tasks

After some time, all contributors from ABC research and other partners such as XYZ university have provided their inputs. Phil has reviewed individual contributions and was suitably impressed by the good work that was achieved by all participants. All individual reports are approved. Behind the scenes, the progress report application produces the final monthly report by collating fragments from each participant. This is done by a backend document templating and processing service provided by Fractal.

Phil is assigned the task to review the final complete report before submission to the advisory board. As he is pretty happy with the final result he submits the report to the board for review but only after adding some comments about Sarah's good progress.

We now switch perspective to Catherine, who is on the board of Big Pharma. Catherine logs into Fractal.. Here 'My Tasks' dashlet shows she has been assigned to review the progress report

prepared by Phil and his team. By using an online text editor similar to the one we've seen before, she can view the report, and edit if necessary. Everything seems fine so Catherine approves the report. Finally, Phil checks the status of his progress report. All board members have approved the work he has done in collaboration with ABC research and XYZ university.

Fractal makes the final output available online in the shared content space that Phil and others can read. The content has also been automatically archived to secure storage using an archiving service that Fractal provides. An email has also been sent to all the participants to notify them that the progress report is now complete.

Summary

This report showed the features of a specific type of active behavior: a workflow that coordinates human steps and automated steps. There are several other types of active behavior, such as bulk processing, that were not shown here. We showed the prototype's active behavior engine in action and the various features that Fractal provides for messaging, content management and task assignment. Future work will focus on making active behaviors more scalable and enabling end users to create and modify active behaviors.

References

- [1] **Fractal Conceptual Prototype Videos : Content Spaces** (2008), accompanying materials of this report, <http://www.hpl.hp.com/techreports/2009/HPL-2009-66-demo.swf>
- [2] David Banks, John Erickson, Michael Rhodes (2009), **Multi-tenancy in Cloud-based Collaboration Services**: <http://www.hpl.hp.com/techreports/2009/HPL-2009-17.pdf>
- [3] John Erickson, Susan Spence, Michael Rhodes, David Banks, James Rutherford, Edwin Simpson, Guillaume Belrose, Russell Perry (2009), **Content-Centered Collaboration Spaces in the Cloud**: <http://www.hpl.hp.com/techreports/2009/HPL-2009-11.pdf>
- [4] Edwin Simpson, Guillaume Belrose, James Rutherford, (submitted March 2009), **Fractal Conceptual Prototype: Content Spaces**, HP Labs Technical Reports, <http://www.hpl.hp.com/techreports/2009/HPL-2009-64.html>
- [5] Edwin Simpson, Guillaume Belrose, James Rutherford, (submitted March 2009), **Fractal Conceptual Prototype: the Extensions Marketplace**, HP Labs Technical Reports, <http://www.hpl.hp.com/techreports/2009/HPL-2009-65.html>