DigiApproval

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1 Your summary of the Challenge

A thriving, vibrant city should make it easy for citizens and small businesses to run public events. At the same time, regulations and permit systems are needed to make sure that events are run in a safe, community-friendly and sustainable way.

Unfortunately, the proliferation of regulations and permits has made running events into something more akin to navigating a maze. The point of this challenge it to provide Canberrans with a simple, efficient way to navigate that maze.

The goal of the challenge is to provide residents and businesses with a clear, streamlined way to navigate the various approvals required. The system should provide a central point of contact so that, as far as possible, a single public servant sees the process through from start to finish and is able to help resolve problems as they come up. The system should lay out the requirements clearly, providing tools like checklists to ensure that applicants understand what is required of them and can meet those requirements with a minimum of fuss.

2 Your concept of how to address it

Our solution is a web based *workflow engine*, that provides superior flexibility to directorates, a consistent user interface to applicants, and utilises standardised components so it can be constructed within 3 months and maintained cheaply and easily.

2.1 Underlying concept

Our concept can be summarised as a flexible, web-based *workflow engine*.

2.1.1 Introducing our characters

- An *applicant* is someone trying to organise an event or apply for a permit.
- A *directorate* is the body that an applicant must work with to get one or more of the permits they require. Within a directorate, there are 3 roles:
  - An *administrator*, who sets up the application process in terms of workflows, as detailed bleow.
  - An *approver* works with an applicant to progress their application.
  - A *manager* is responsible for balancing the workload amongst approvers.

2.1.2 What is a workflow?

A workflow is a tailored set of steps to achieve a particular outcome. For example, applying for a permit to serve alcohol is a workflow, and applying for a permit for traffic managment is a workflow. Workflows can contain other workflows, and have optional steps, so the entire process of organising an event could be one big workflow.

The concept of a workflow is sufficiently flexible to encompass the range of steps and options in a practical approval process.

- Workflows can contain steps that an applicant must take, and steps that an approving agency must take. These steps can contain a variety of steps: applicants steps can involve uploading documents, filling in forms, and so on; agency steps can include review, approval, etc.
- Applicants and approvers are notified when the application changes from one state to another, for example by email.
- Workflows do not need to be linear. For example, if an event management plan is insufficient, rather than rejecting the entire application, the applicant can be directed back to resubmitting the event management plan until it is satisfactory.
- Workflows can be easily visualised as flow charts, so the status of an application is clear to the applicant and to the approving directorate at a glance.
- Workflows can contain information about time limits: for example if required documentation is not sumbitted within the required time period, the workflow can automatically transition to an expired state.

A sample workflow demonstrating these features is shown below. This workflow is a very simple sample of an approval process involving an event management plan. Steps an applicant takes are blue, and steps approvers take are green.

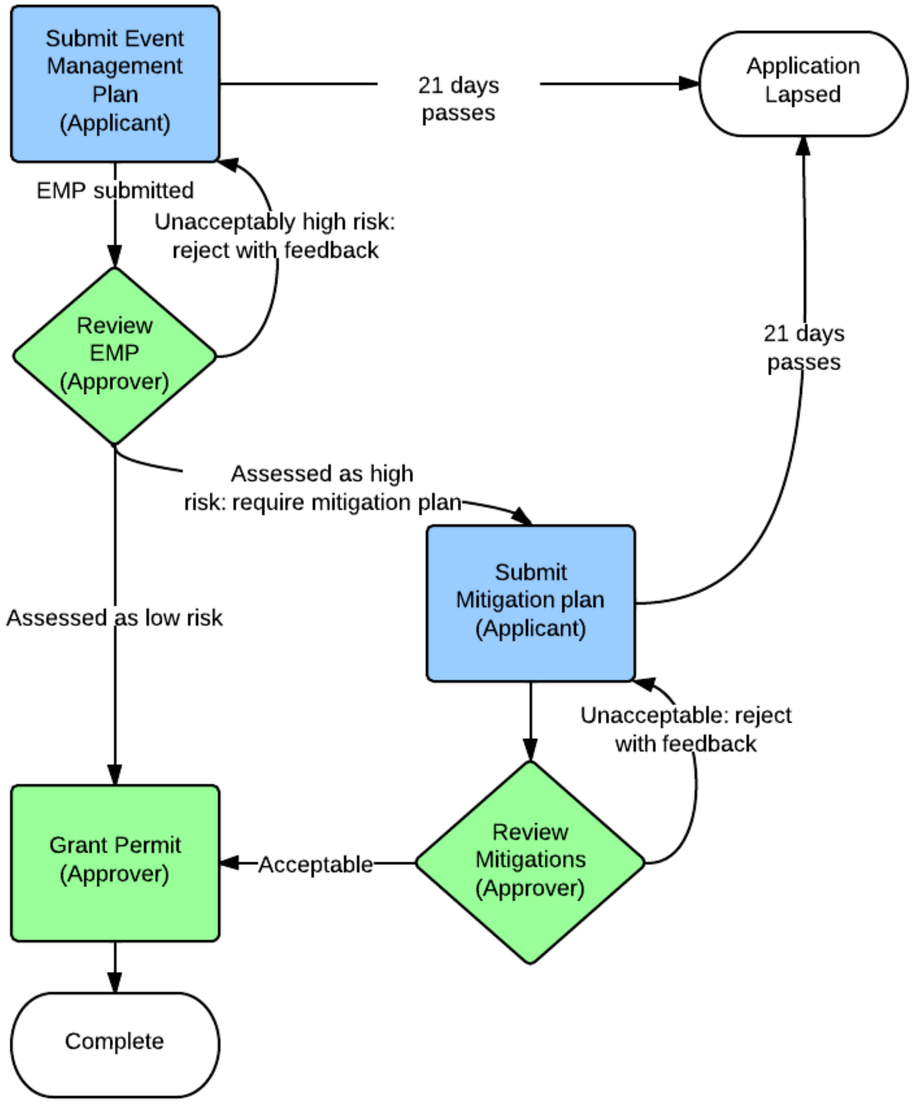

Submit Event Management Plan (Applicant)
21 days passes
Application Lapsed
EMP submitted
Unacceptably high risk: reject with feedback
Review EMP (Approver)
21 days passes
Assessed as high risk: require mitigation plan
Submit Mitigation plan (Applicant)
Assessed as low risk
Unacceptable: reject with feedback
Grant Permit (Approver)
Acceptable
Review Mitigations (Approver)
Complete

Figure 1: Sample workflow

Workflows, as we have conceptualised them, have other benefits too:

- Workflows can bring together all the relevant documentation in one place. A step that requires an applicant to upload a document can contain information about what the document is supposed to contain. Steps that an approver must take can include information about how a document is to be reviewed, so as to ensure consistency amongst staff. This information is not shown to applicants, so internal processes can be documented.
- Workflows can contain other workflows: for example a workflow for running an event could guide an applicant through the relevant approvals. Each of those approvals is its own workflow, so if an applicant knows they only need a specific permit, they can do that workflow individually. (This also means that individual directorates can update and improve the workflows for which they are responsible, without it breaking the overall process.)

2.1.3 Setting up the system

Before an applicant can use the system, an administrator must create workflows.

- A web interface will allow administrators to build fully functional workflows without requiring additional code to be written. The administrator will be able to specify the steps in the workflow, whether they are done by approvers or the applicant, and provide any information necessary for each step to be completed.
- The web interface will be able to present the workflow as a flow chart, so that management within the directorate can easily verify that the web process matches up with legislative requirements and existing processes.
- The workflow will not be presented to the public until it is expressly made live.

2.1.4 Using the system: applicant

Before an applicant can begin a workflow, they must register as a user.

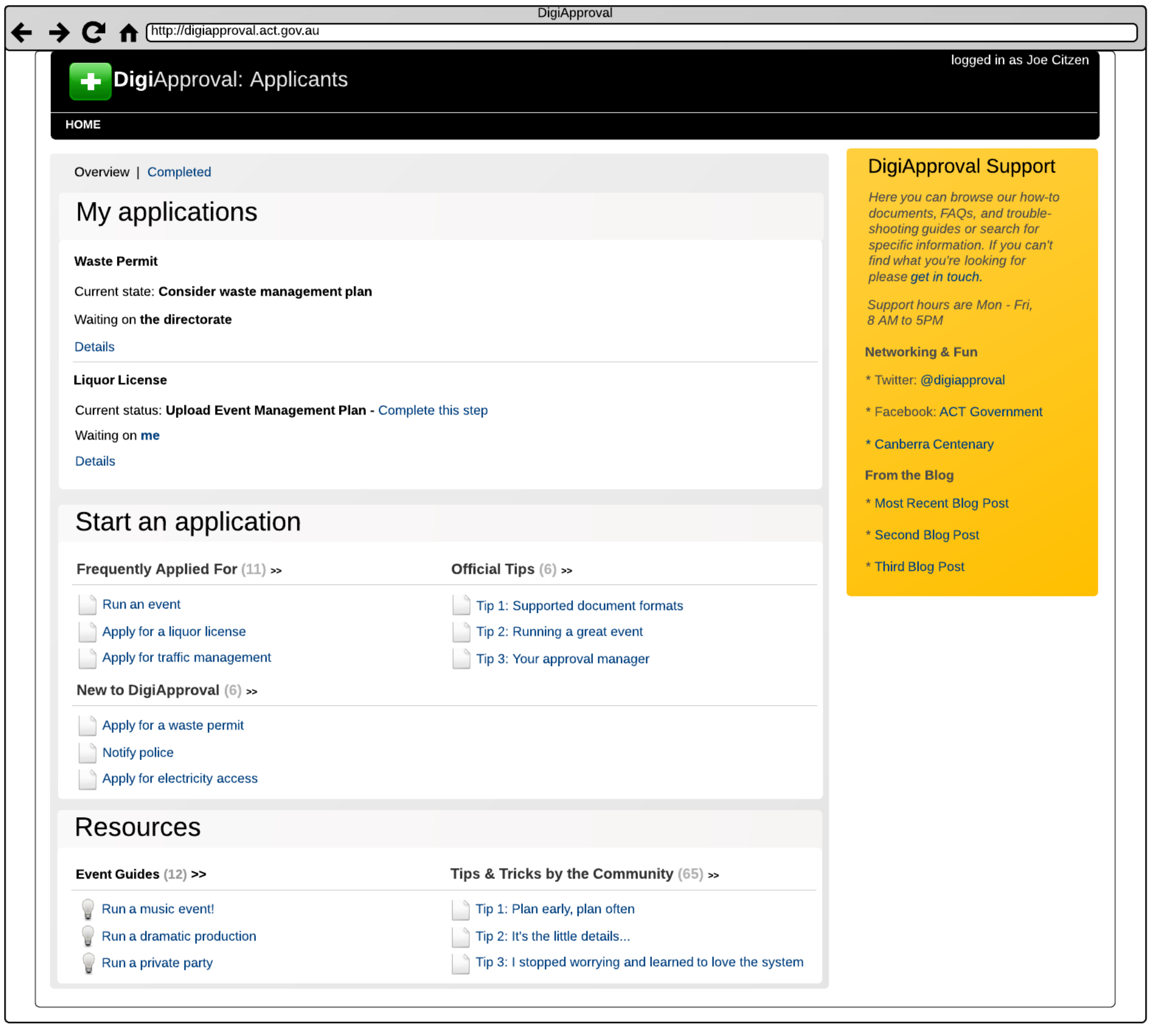
Once they register with their name and contact details, they will be presented with a dashboard showing at a glance:

- **Workflows that they can commence.** Once a workflow is commenced, the directorate is notified, and the application is assigned to an approver.
- **Any existing applications that they have begun**, and the stage those applications are at. Applicants can pull up the details of their applications and see the entire history in one place. They can then make sure that they have completed any steps

necessary for them to complete. The approver responsible for their application is notified whenever the applicant completes a step.

- **A link to contact the approver assigned to help them progress their workflow**.
- **A link to access completed applications**, should they need to re-download any documents/approvals.

A very loose concept of what this might look like is shown below.



DigiApproval

http://digiapproval.act.gov.au

logged in as Joe Citzen

DigiApproval: Applicants

HOME

Overview | Completed

My applications

Waste Permit

Current state: **Consider waste management plan**

Waiting on **the directorate**

Details

Liquor License

Current status: **Upload Event Management Plan -** Complete this step

Waiting on **me**

Details

Start an application

Frequently Applied For (11) >>

Run an event

Apply for a liquor license

Apply for traffic management

Official Tips (6) >>

Tip 1: Supported document formats

Tip 2: Running a great event

Tip 3: Your approval manager

New to DigiApproval (6) >>

Apply for a waste permit

Notify police

Apply for electricity access

Resources

Event Guides (12) >>

Run a music event!

Run a dramatic production

Run a private party

Tips & Tricks by the Community (65) >>

Tip 1: Plan early, plan often

Tip 2: It's the little details...

Tip 3: I stopped worrying and learned to love the system

DigiApproval Support

Here you can browse our how-to documents, FAQs, and trouble-shooting guides or search for specific information. If you can't find what you're looking for please get in touch.

Support hours are Mon - Fri, 8 AM to 5PM

Networking & Fun

* Twitter: @digiapproval

* Facebook: ACT Government

* Canberra Centenary

From the Blog

* Most Recent Blog Post

* Second Blog Post

* Third Blog Post

Figure 2: Potential user wireframe

2.1.5 Using the system: approvers

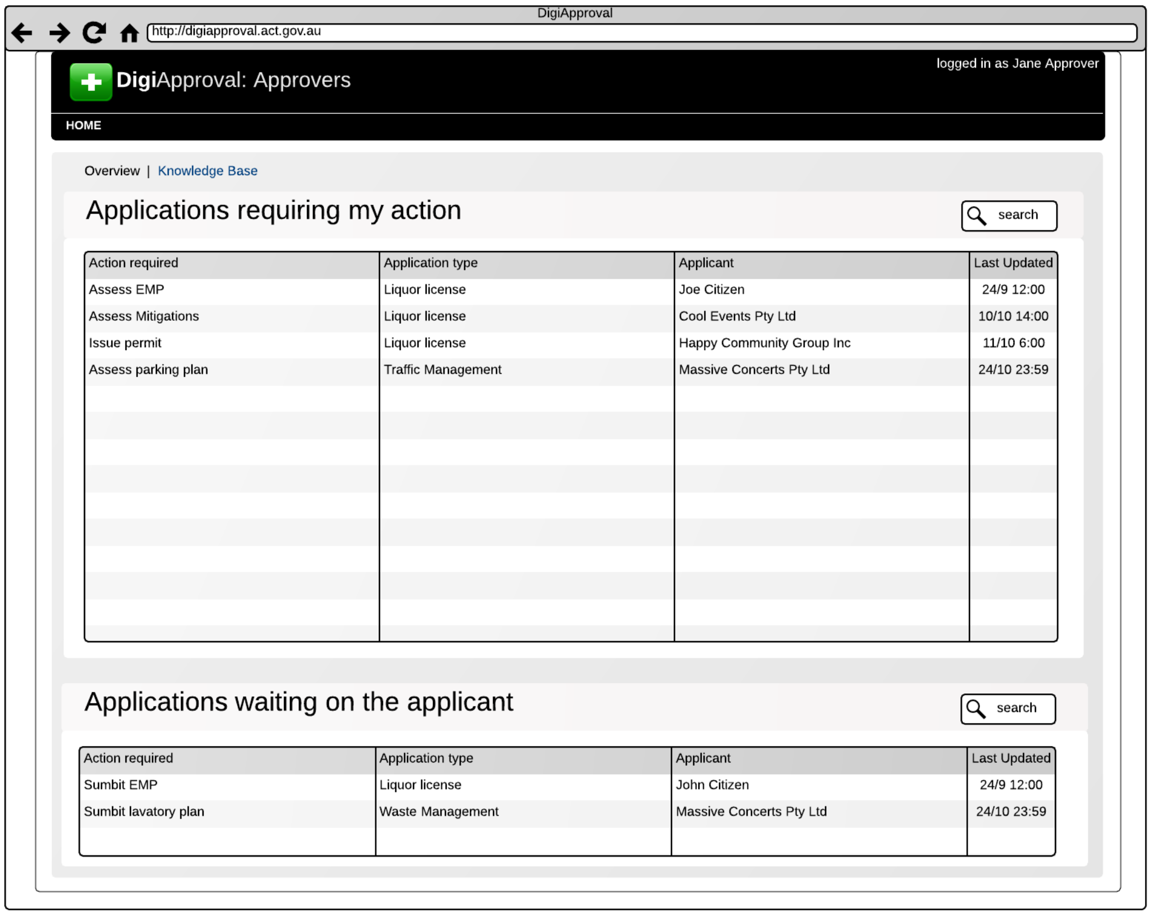
The workflow system streamlines the job of those tasked with improving applications and makes it easy for them to provide excellent service.

When an approver logs in, they can see at a glance:

- The applications for which they are responsible.
- The status of those applications: are they waiting on the applicant, or are they "in my court"?

Approvers can then pull up an application for which they are responsible, see its entire history in one place, and take any steps necessary to progress it. The applicant is notified whenever the approver completes a step.

A very loose concept of what this might look like is shown below.


DigiApproval
http://digiapproval.act.gov.au
DigiApproval: Approvers
logged in as Jane Approver
HOME
Overview | Knowledge Base
search
search

Applications requiring my action

Action required	Application type	Applicant	Last Updated
Assess EMP	Liquor license	Joe Citizen	24/9 12:00
Assess Mitigations	Liquor license	Cool Events Pty Ltd	10/10 14:00
Issue permit	Liquor license	Happy Community Group Inc	11/10 6:00
Assess parking plan	Traffic Management	Massive Concerts Pty Ltd	24/10 23:59

Applications waiting on the applicant

Action required	Application type	Applicant	Last Updated
Sumbit EMP	Liquor license	John Citizen	24/9 12:00
Sumbit lavatory plan	Waste Management	Massive Concerts Pty Ltd	24/10 23:59

Figure 3: Potential approver wireframe

2.1.6 Using the system: managers

Managers are responsible for allocating approvers to handle various requests. A manager assigns a workflow that has just commenced to an approver, and is able to re-allocate in-progress workflows if needed. (For example, if an approver is ill or leaves the directorate.)

2.1.7 Summary of concept

The key advantages of our approach are:

- Flexiblity: changes to procedures not require programmer intervention
- Consistency: Applicants deal with a consistent approver, while the directorate retains the flexibility to change approvers if the circumstances require it.
- Central repository for information and state: all parties involved can see the progress at a glance, who has to take the next step.

2.2 Implementation

We intend to implent the system in Django, a well known web framework for the Python programming language. Django is used on sites that deal with millions of hits, so it is known to be able to scale. It is also has a large community of users: if we are hit by a bus, it will be easy to find Django developers to keep the system running.

The implementation will focus on scalability, security and portability.

2.2.1 Scalibility

The solution has been designed from the ground up for scalability, by decoupling and disaggregating functions into layers that are known to be scalable.

As the diagram on the next page shows, our solution can be decomposed into a web layer, an application layer, a set of asynchronous workers and a storage layer (file store and database).

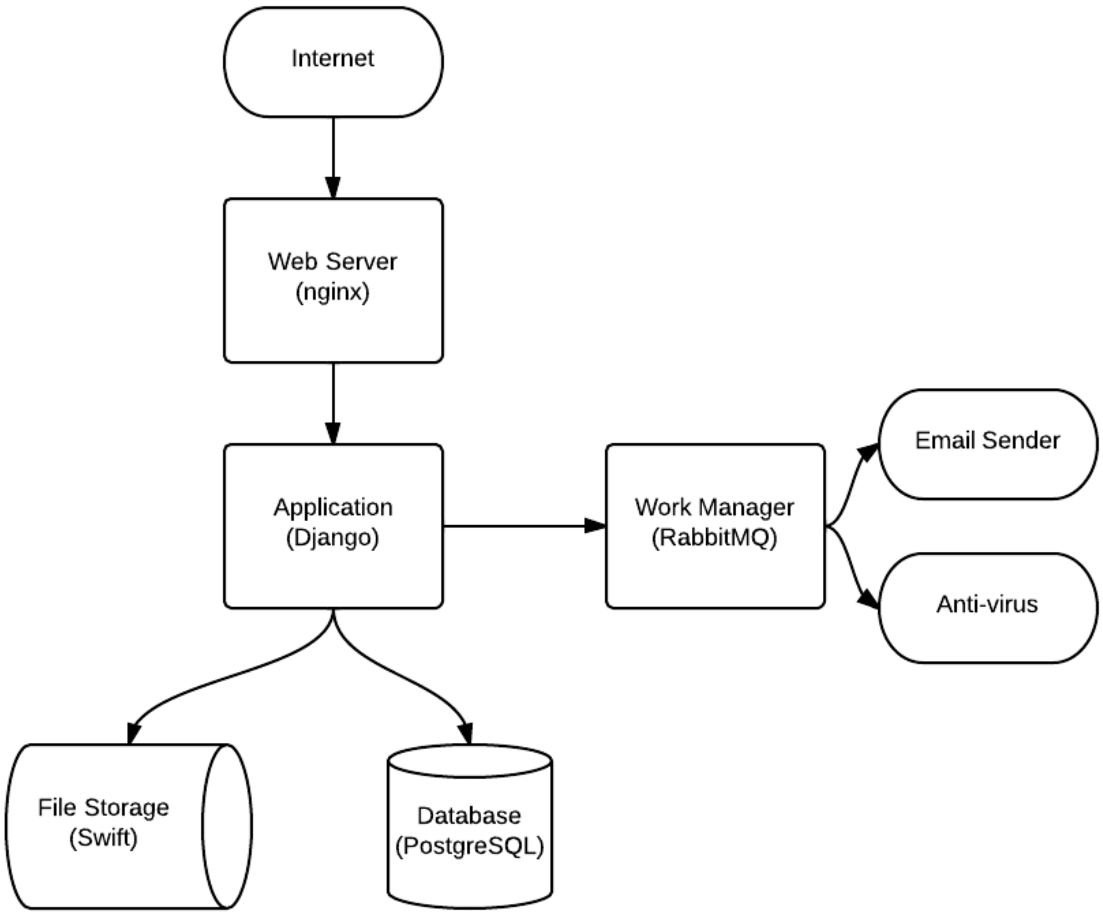


Figure 4: Application architecture

Each of these layers is horizontally scalable: if heavy usage of the web layer is detected, additional web server can be added without requring any changes to the application code. Similarly, if the database is slow, the database layer can be scaled without requiring the application code to be changed. An example of a scaled up configuration is shown below.

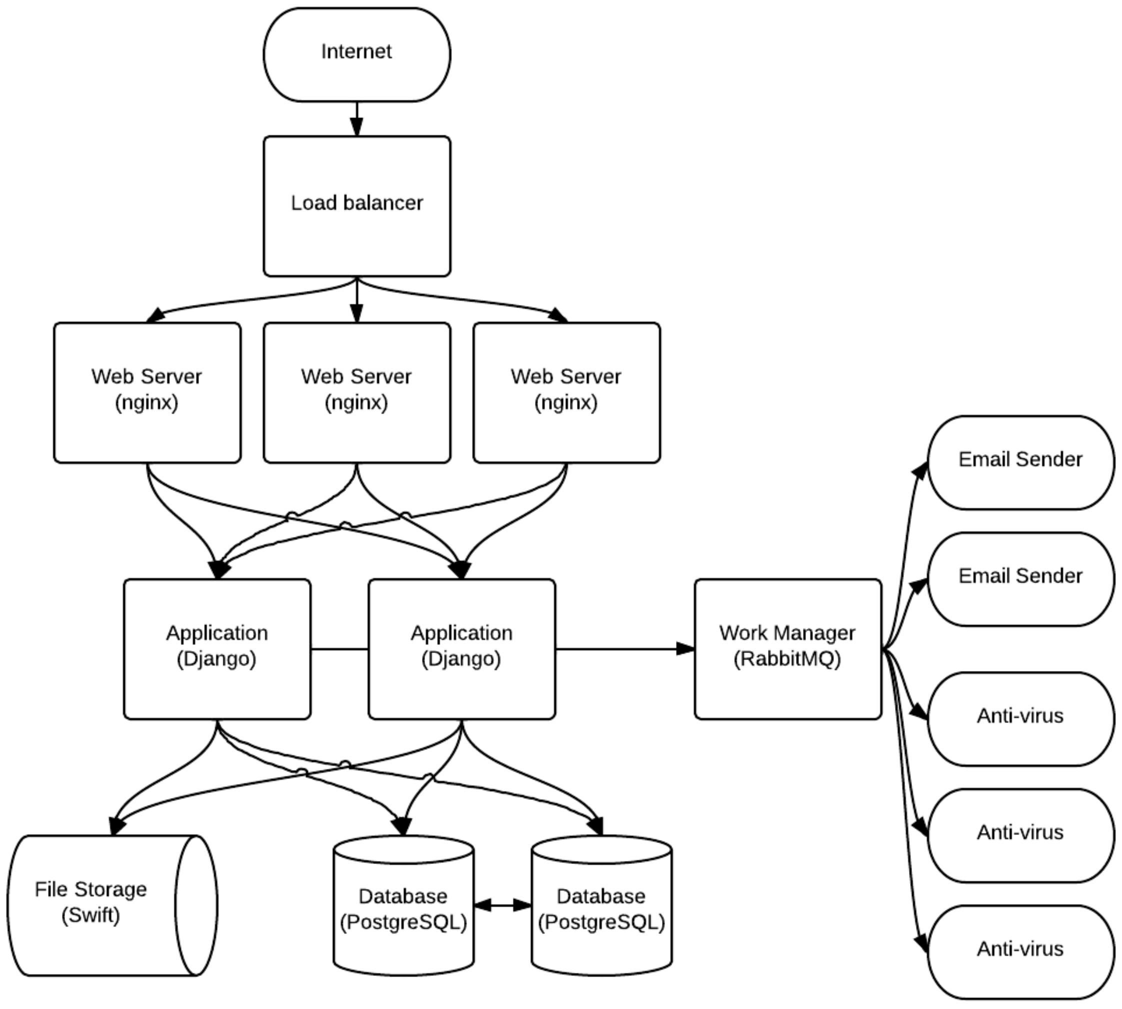


Figure 5: Example of a way to scale the application

Each layer can be scaled to suit demand, allowing scaling to address the bottleneck without adding unnecessary infrastructure. Similarly, the whole system can be scaled down: the entire system could concievably be run on a single server if demand is not too great.

2.2.2 Security

Our system is designed to be able to solidly *authenticate* users, determine what those user are *authorised* to do, ensure the *integrity* of their actions and the system as a whole, while maintaining *confidentially* of applicant and directorate information, using industry best practices.

We will deploy SSL at the front end to ensure applicant passwords and information is encrypted while in transit. We will be implementing as much functionality as possible through standard libraries, reducing the scope for security flaws and error on our part.

We will also be taking a proactive approach to security wherever possible. For example, a major source of security flaws arise from not verifying user input. Our system will make sure that we that user input is valid, make sure that uploaded documents are of the expected format and are free from known viruses, and so on, *before* they are presented to approvers.

2.2.3 Portability

We will be developing our system on Amazon Web Services (AWS), however our system will not depend on any feature of the AWS infrastructure. This provides flexibility in regards to the systems final hosting environment; whether that be AWS or not. For example if control of data is a concern, the system could be moved to government systems without needing to rewrite sections of the codebase.

We will be ensuring this by using proven, industry-standard, open-source technologies throughout.

Our current proposed stack is:

- Our web layer will be implemented with nginx.
- As discussed, our application layer will be implemented with Django.
- Our worker layer will be implented using RabbitMQ. Having a worker model allows us to perform time-consuming tasks such as scanning for viruses or sending emails without making our user interface non-responsive.
- Our database layer will be implemented with PostgreSQL.
- Our file storage layer will be implemented using OpenStack Swift.

If necessary, we may substitute other standard, proven, open-source technologies.

3 Your proposed project milestones

We propose the following milestones:

- By the end of week 1: Infrastructure set up, technology stack working.
- By the end of week 4: Static (manually coded) workflows work.
- During week 9/10: Dynamic (user entered) workflows can be created and work.

We will then use the time until the end of week 12 to polish the user interface and catch up on any missed milestones. Providing this "buffer time" means we are better equiped to deal with any unexpected issues that develop.

4 The critical dependencies

4.1 Key Assumptions

- Directorate procedures are, or can be, reduced to a workflow. Given that they are bureaucratic processes, this should be possible.

4.2 Key Requirements

- Directorate involvement to help define a proof-of-concept workflow.
- Directorate feedback to inform and refine the prototype as it develops.
- Some costs, as detailed below.

5 Likely costs

Our main cost will be hosting. To ensure we design in a scalable way, we will be using a number of instances on AWS. This prevents us from accidentally making assumptions that will not hold true if the system is scaled up. Our estimate is for 6 AWS t1.micro instances for 3 months, for an estimated $75/month, or $225 for the duration of the bake-off.

We will also have some one-off costs associated with an SSL certificate. This will cost around $75.

Our total estimated costs are $300.

6 Your full solution assessment

The full details for our proof-of-concept are listed above.

Assuming our proof-of-concept is successful, the following major steps would be required to deploy it publically:

- **The services of a skilled graphics designer**. We have a range of coding and user-experience skills, but we lack good graphics skills. A skilled graphics designer would be needed to make things aesthetically appealing and consistent with the rest of the visual identity across the ACT government.
- **A further period of development**. Our prototype will inevitably have some rough edges. It will need an extra couple of months of full-time work to bring it up to a deployable standard, especially with regards to:
  - accessibility (e.g. to WCAG 2.0 standard)
  - load-testing
  - fault tolerance and testing
  - documentation
- **Deployment on government servers.**
- **Training of users within departments.** This is probably going to be the most time-consuming aspect of a final deployment. Users will need to be trained to work with the application, create work-flows, and IT staff will need to be trained to support the system.

7 Your eligibility

I, Daniel Axtens, declare:

- I am an ACT resident and a tertiary student at The Australian National University (u5376292)
- There are no conflicts of interest arising if I am involved in implementing the challenge.

I, Andrew Donnellan, declare:

- I am an ACT resident and a tertiary student at The Australian National University (u4837946)
- There are no conflicts of interest arising if I am involved in implementing the challenge.

I, Benjamin Roberts, declare:

- I am an ACT resident and a tertiary student at The Australian National University (u5350335)
- There are no conflicts of interest arising if I am involved in implementing the challenge.