

Airline booking application overview

1 Running the application

1.1 Starting the server

Pull the image from GHCR:

```
docker pull ghcr.io/jarrowsm/flightapp:latest
```

then run the server with

```
docker run -p PORT:8000 ghcr.io/jarrowsm/flightapp:latest
```

The `dbprime.py` script has populated the database with random synthetic data ahead of building the Docker image. Schedule is filled for 100 days from today and 400 customers with 500 bookings are inserted. These values may be changed with arguments to `dbprime.py` after flushing the database with

```
python manage.py flush
```

You may also choose to exclude basic or synthetic data. For example, if wanting to first test without synthetic data, use `--no-synth`, and then with synthetic data, `--no-basic` should be used to avoid errors. Figure 1.1 shows the help information for `dbprime.py`.

```
Priming database
usage: dbprime.py [-h] [--no-basic] [--no-synth] [--schedule-days SCHEDULE_DAYS]
                  [--customers CUSTOMERS] [--bookings BOOKINGS]

Populate the database

options:
  -h, --help            show this help message and exit
  --no-basic            Exclude basic data (Aircraft, Airport, Schedule)
  --no-synth            Exclude synthetic data (Customer, Booking)
  --schedule-days SCHEDULE_DAYS
                        Number of days ahead of today to insert into Schedule
  --customers CUSTOMERS
                        Number of synthetic rows to insert into Customer
  --bookings BOOKINGS  Number of synthetic rows to insert into Bookings
```

Figure 1.1: `dbprime.py` help information

2 Landing page

Figure 1.2 depicts the landing page. It includes a ‘hero banner’ which provides login capabilities (see Section 4) and a feature to search flights. A featured destinations section is also included.

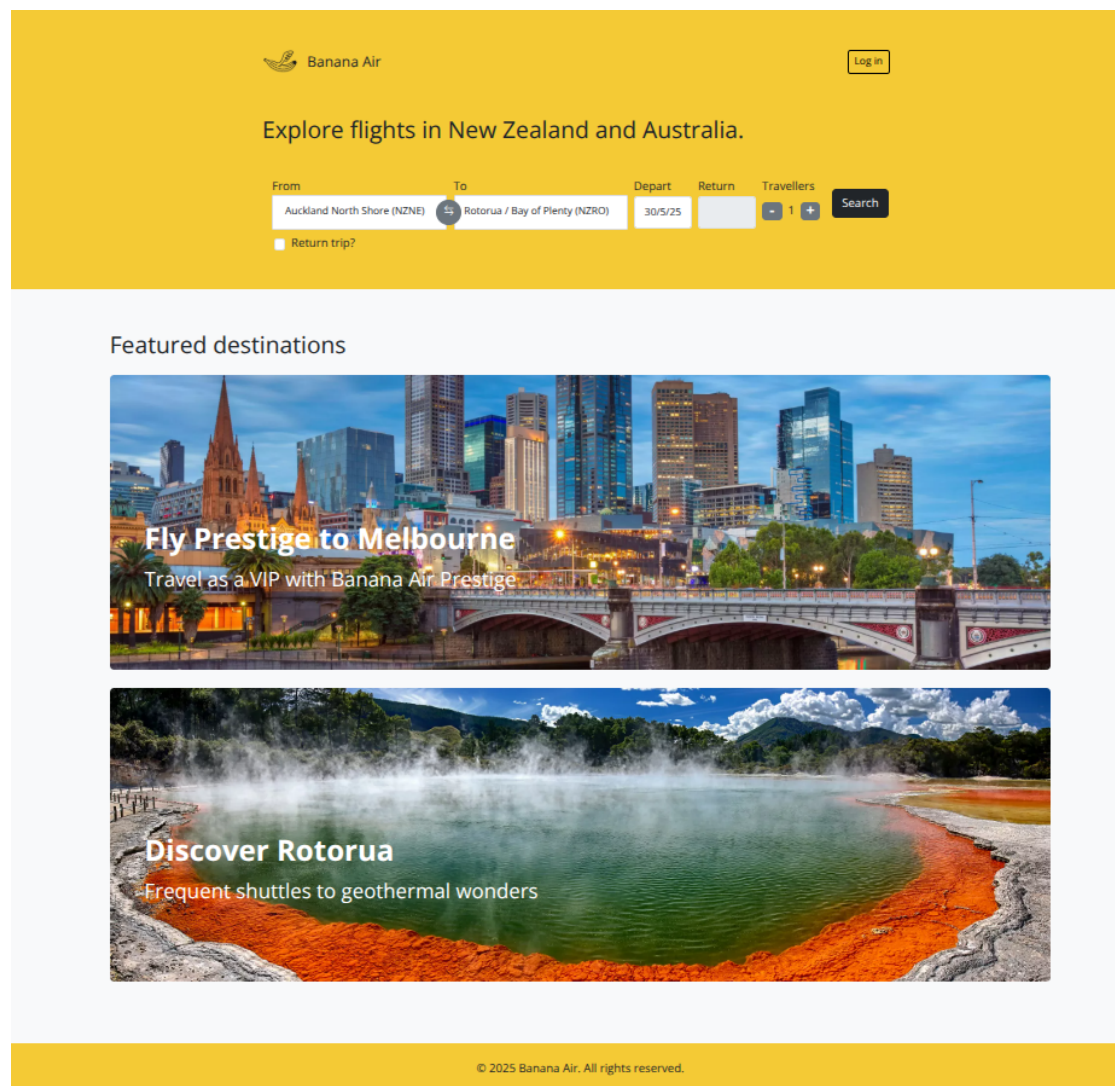


Figure 1.2: Landing page

2.1 Search bar

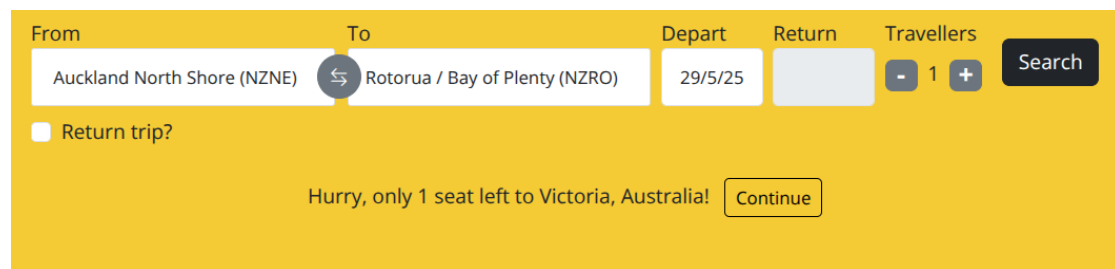
Choices.js [2] provides searchable select inputs for the origin and destination as shown in Figure 1.3. Choices.js was chosen as it is lightweight, dependency-free and compatible with vanilla JS. Destinations are set dynamically according to origin via an AJAX request to the destinations/URL. Between select inputs is a button to swap the origin and destination (refreshing the destinations and flight dates). Beneath these elements, a return checkbox toggles the return datetime input.

Figure 1.3: Searchable origin and destination select inputs

Another lightweight plugin, Flatpickr [4], was used for departure and return datetime inputs (Figure 1.4). Using dates attained from the flight_dates/ URL, grey marks are inserted to indicate dates with flights with seats remaining. The departure date is automatically set to the next available flight and, with the return textbox selected, the return date is set to the first available return flight after the departure. These dates are refreshed with changes to the origin and destination. Finally, the number of travellers—between one and six—may be chosen via two buttons which decrement and increment the value respectively.

Figure 1.4: Searchable origin and destination select inputs

Should the user select flights but leave at either the registration (Section 4) or confirmation (Section 5) steps, a call to action (CTA) displays the seats remaining and links to where the user left off, as shown in Figure 1.5.



A yellow rectangular form for resuming a booking. It contains fields for 'From' (Auckland North Shore (NZNE)), 'To' (Rotorua / Bay of Plenty (NZRO)), 'Depart' (29/5/25), 'Return' (empty), and 'Travellers' (1). A 'Search' button is on the right. Below these fields is a checkbox for 'Return trip?'. At the bottom, a message says 'Hurry, only 1 seat left to Victoria, Australia!' with a 'Continue' button.

Figure 1.5: Resume booking CTA


To complete the landing page, I include a featured destinations section with banners for Melbourne and Rotorua (see Figure 1.2). Clicking on these appropriately modifies the origin and destination and creates a fading shadow highlighting this (Figure 1.6).



A yellow rectangular form showing the search bar after clicking the Melbourne banner. The 'From' field is 'Auckland North Shore (NZNE)' and the 'To' field is 'Victoria, Australia (YMML)'. There is a 'Return trip?' checkbox below the fields.

Figure 1.6: Search bar after clicking the Melbourne banner

3 Searching for flights

 Auckland North Shore ⇄ Rotorua / Bay of Plenty Log in

Outbound

| | | | | | | |
|--------------------|--------------------|--------------------|-------------------------------|-------------------------------|--------------------|-------------------|
| Mon 26 May – | Tue 27 May – | Wed 28 May – | Thu 29 May From \$80.00 | Fri 30 May From \$74.00 | Sat 31 May – | Sun 1 Jun – |
|--------------------|--------------------|--------------------|-------------------------------|-------------------------------|--------------------|-------------------|

5:35 PM
Auckland North Shore (NZNE) — 45m —> Rotorua / Bay of Plenty (NZRO)
BA005 ⓘ

6:20 PM
Rotorua / Bay of Plenty (NZRO)

\$80.00 per ticket
✈ 3 seats left at this price
☐ Select

Return

| | | | | | | |
|-------------------------------|--------------------|-------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Fri 30 May From \$80.00 | Sat 31 May – | Sun 1 Jun – | Mon 2 Jun From \$112.00 | Tue 3 Jun From \$107.60 | Wed 4 Jun From \$112.00 | Thu 5 Jun From \$105.20 |
|-------------------------------|--------------------|-------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|

10:30 AM
Rotorua / Bay of Plenty (NZRO) — 45m —> Auckland North Shore (NZNE)
BA004 ⓘ

11:15 AM
Auckland North Shore (NZNE)

\$112.00 per ticket
✈ 0 seats left at this price
☐ Select

11:30 PM
Rotorua / Bay of Plenty (NZRO) — 45m —> Auckland North Shore (NZNE)
BA006 ⓘ

12:15 AM (next day)
Auckland North Shore (NZNE)

\$112.00 per ticket
✈ 1 seat left at this price
☐ Select

Book selected

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Figure 1.7: Search page for a round-trip flight to Rotorua

Figure 1.7 depicts the search page for a round-trip flight to Rotorua. Starting with the date cards, each displays the lowest price out of flights with seats available (unless all flights are fully booked, in which case the lowest overall price is displayed). These link to the search with updated date parameters. Since the return comes after the outbound, the departure/return will also be updated if a departure after or return before is chosen. This is also validated at the server-side, but front-end logic also ensures any click entails a single GET request. Dates earlier than today (GMT) are greyed out and unclickable, while the price is struck on fully-booked dates. For dates with no flights, a simple message is displayed.

Beneath the dates, key information is provided for each flight: departure and arrival regions,

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ICAO codes and times, flight duration, flight number, ticket price and seat availability. All times are in local times for the respective regions and a ‘next day’ tag is shown if the flight runs overnight. Also, a popover is shown on hovering over the (?) icon, as in Figure 1.8 for a Melbourne departure. Only flights after the current time are retrieved—the early outbound is absent from Figure 1.8 as it departed before the current time. Prices are dynamically calculated, increasing with fewer remaining seats and days until departure, with the base price restored three days in advance.

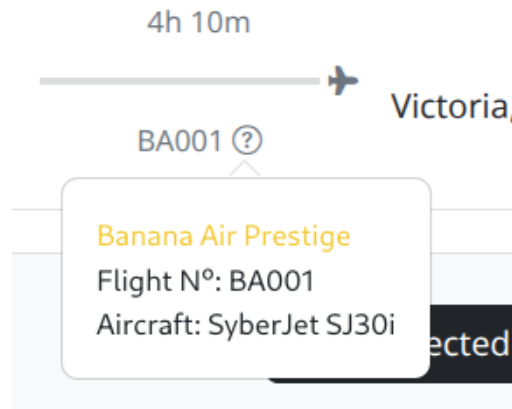


Figure 1.8: Popover for Melbourne departure

Selections are thoroughly validated at the server side with errors appearing as Bootstrap toasts. Figure 1.9 shows the error when selecting a full flight. Selecting this flight was not prevented on the front-end to make the error clearer to the user. Figure 1.10 shows the warning when a flight has too few seats for the number of travellers—the flight can still be booked with the available seats. Moreover, a return flight departing before the outbound flight arrives is not allowed (Figure 1.11). Additionally, the query parameters themselves are validated and errors are displayed with a link to the index page (Figure 1.12).

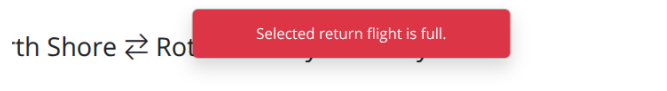


Figure 1.9: Flight full error

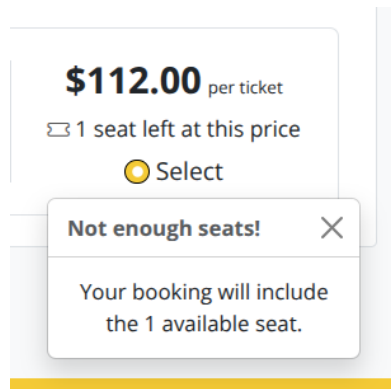


Figure 1.10: Too few seats warning

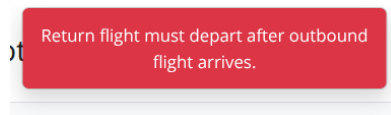


Figure 1.11: Return flight departing before outbound arrives error

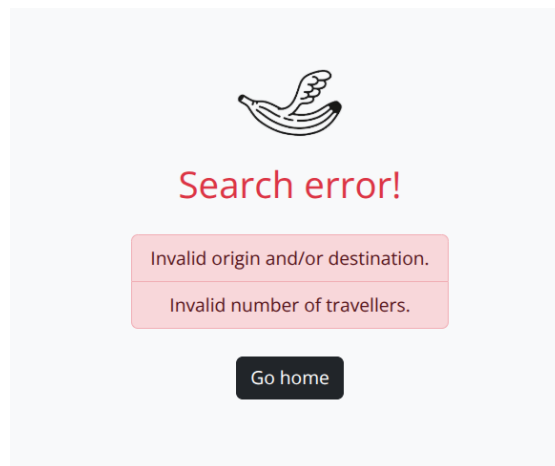

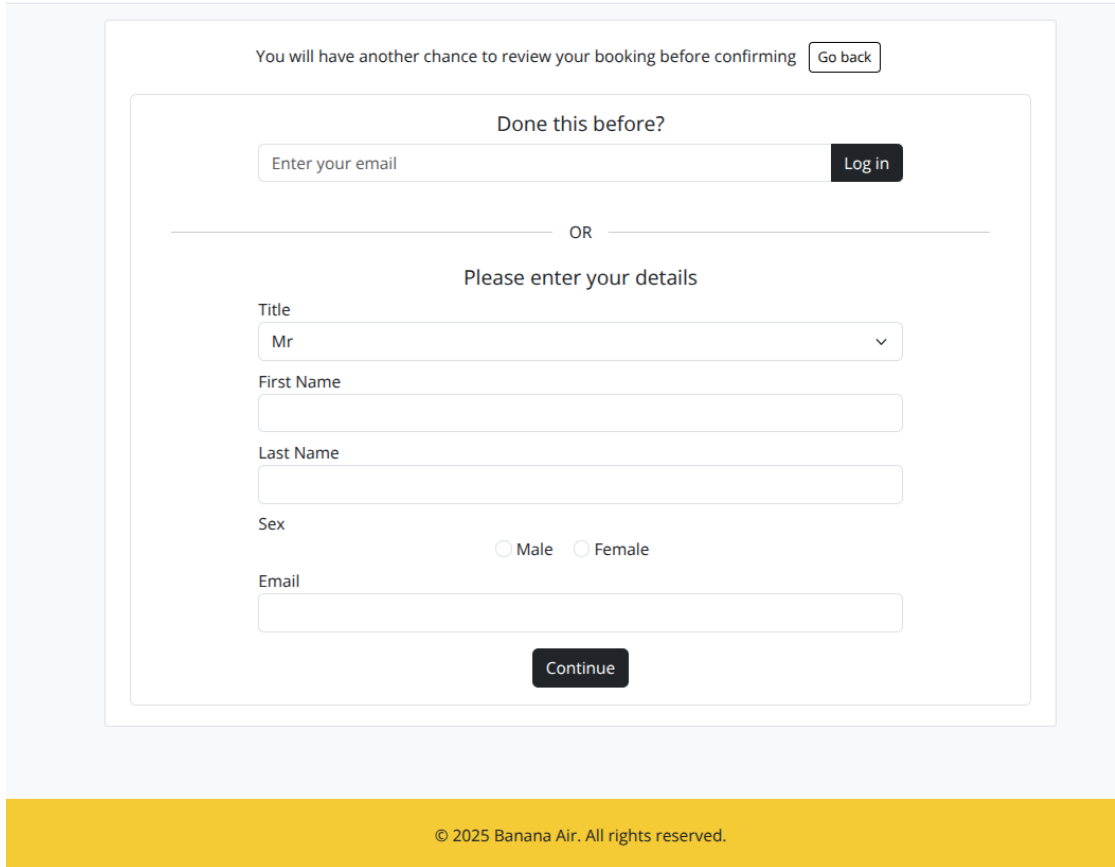


Figure 1.12: Page shown after search query errors

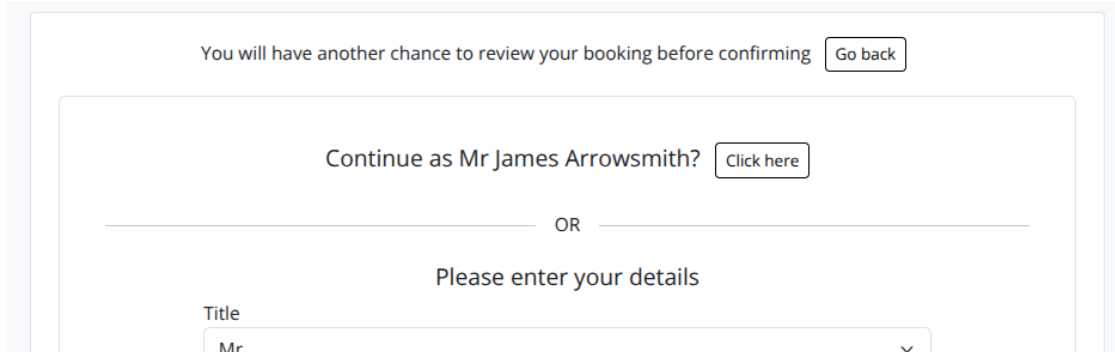
4 Registration

 Confirm your details



The registration page when logged out features a light gray background. At the top, a message states: "You will have another chance to review your booking before confirming" with a "Go back" button. Below this is a section titled "Done this before?" containing an email input field and a "Log in" button. A horizontal line with "OR" in the center separates this from the main registration form. The form is titled "Please enter your details" and includes fields for Title (a dropdown menu with "Mr" selected), First Name, Last Name, Sex (radio buttons for Male and Female), and Email. A "Continue" button is at the bottom of the form. A yellow footer bar contains the text "© 2025 Banana Air. All rights reserved."

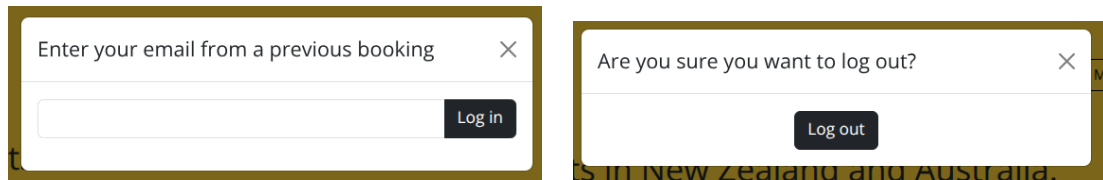
Figure 1.13: Registration page when logged out



The registration page when logged in has a similar layout to the logged-out version. At the top, the same message and "Go back" button are present. The "Done this before?" section now displays "Continue as Mr James Arrowsmith?" with a "Click here" button. The "Please enter your details" section is partially visible, showing the "Title" dropdown menu with "Mr" selected.

Figure 1.14: Registration page when logged in

After selecting flights, the user is asked to register their details. Alternatively, they may continue with an email used for a previous booking. Sessions track the booking process and prevent users from accessing this or the bookings page (Section 6) too early. Figure 1.14 shows the register page when logged in. The login system, while not secure, reduces the time to make multiple bookings. Login buttons appear on the index page and navbar of some other pages. These present a Bootstrap modal with an email or confirm form (Figure 1.15). JS is used to avoid an unnecessary refresh.



(a) Modal shown when logging in

(b) Modal shown when logging out

Figure 1.15: Login system modals

When logged in, a button is displayed that links to the bookings page as shown in Figure 1.16.

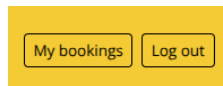



Figure 1.16: Index page detail when logged in

5 Confirmation

 Confirm your booking

Confirm booking for **Mr James Arrowsmith** - jarrowsmith@proton.me [Modify](#)

[Show route](#) [Change flights](#)

Round-trip
Outbound – May 29, 2025

| | | | |
|---|----------------|--|--------------------|
| 5:35 PM Auckland North Shore (NZNE) | 45m BA005 ⓘ | 6:20 PM Rotorua / Bay of Plenty (NZRO) | 2 × \$80.00 |
|---|----------------|--|--------------------|

Return – Jun 3, 2025

| | | | |
|---|----------------|---|---------------------|
| 11:30 PM Rotorua / Bay of Plenty (NZRO) | 45m BA006 ⓘ | 12:15 AM (next day) Auckland North Shore (NZNE) | 2 × \$107.60 |
|---|----------------|---|---------------------|


Total \$375.20_{NZD}
[Book](#)

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Figure 1.17: Confirmation page

The confirmation page, shown in Figure 1.17, provides another opportunity to check the flights before booking. It highlights the flight information with the number of tickets and prices. The user may modify their customer details or change flights, which takes them back to their search. Clicking show route shows a relevant map from Great Circle Mapper [5].

6 Booking management

 Your bookings

Thank you for your booking! Ref. ZBIYAZ

Log out

Mr James Arrowsmith - jarrowsmith@proton.me has 2 bookings

Ref. ZBIYAZ · One-way · 1

Show routeView invoiceCancel booking

Outbound - Jun 6, 2025

10:05 AM

Auckland North Shore (NZNE)

4h 10m

BA001 ⓘ

12:15 PM

Victoria, Australia (YMML)

Ref. 8WK4HU · Round-trip · 2

Show routeView invoiceCancel booking

Outbound - May 30, 2025

6:00 AM

Auckland North Shore (NZNE)

45m

BA003 ⓘ

6:45 AM

Rotorua / Bay of Plenty (NZRO)

Return - Jun 3, 2025

11:30 PM

Rotorua / Bay of Plenty (NZRO)

45m


BA006 ⓘ

12:15 AM (next day)

Auckland North Shore (NZNE)

Figure 1.18: Bookings page

Figure 1.18 shows the page after a successful booking. The customer can make multiple bookings and these appear in descending order. Each booking can be cancelled, presenting a confirmation modal followed by a toast, removing the booking and adjusting the schedule. Route maps are also included. This page can be accessed while logged out and displays a message directing the user to log in. Navigating back and rebooking raises the error shown in Figure 1.19.



Error


Booking not available


All bookings

Figure 1.19: Booking error

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7 Invoice

 Invoice 8WK4HU Log out

**Banana Air**
270/284 Postman Road, Dairy Flat 0794, New Zealand
+64 800 494 647
info@bananaair.com

INVOICE
Reference: 8WK4HU
Booking date (GMT): 29/05/2025

BILL TO
Mr James Arrowsmith
jarrowsmith@proton.me

| Aircraft | Flight No | Departure | Destination | Departure Date & Time | Quantity | Ticket Price | Amount |
|-------------|-----------|--------------------------------|--------------------------------|-----------------------|----------|--------------|----------|
| Cirrus SF50 | BA003 | Auckland North Shore - NZNE | Rotorua / Bay of Plenty - NZRO | May 30, 2025, 6:00 AM | 2 | \$74.00 | \$148.00 |
| Cirrus SF50 | BA006 | Rotorua / Bay of Plenty - NZRO | Auckland North Shore - NZNE | Jun 3, 2025, 11:30 PM | 2 | \$108.80 | \$217.60 |

We recommend you arrive at least 1.5 hours before your flight.
Balance due at check-in. Prices shown in NZD.

Balance Due: \$365.60

Print View all bookings

Figure 1.20: Invoice page

Figure 1.20 shows the index page for a return booking. Accessible only when logged in, it includes the customer and company information, booking reference, the date the booking was made (GMT), the schedule information, and the prices and overall balance, with an option to print this page. Appropriate errors are shown with a link to bookings for a missing or invalid reference.

Bibliography

- [1] Bootstrap: Responsive front-end framework. <https://getbootstrap.com/>.
- [2] Choices.js: A vanilla js customisable select box/text input plugin. <https://github.com/Choices-js/Choices>.
- [3] Django. <https://www.djangoproject.com/>.
- [4] Flatpickr: a lightweight and powerful datetime picker. <https://flatpickr.js.org>.
- [5] Great circle mapper. <https://www.gcmap.com>.