Functional testset

for the Beter Benutten MMRI project

I Unit tests for the functional requirements

The numbering in this section corresponds to the numbering of the requirements in the GAP Analysis document and the numbering of the test case implementation.

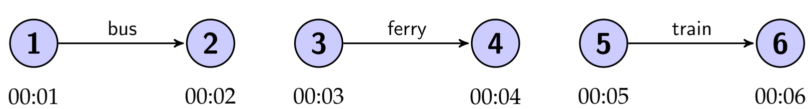
Note that planning on the transit network is the current scope of the MMRI project, so the testrunner will ignore any walk legs encountered in the result.

A Support all transit modes and agencies

1a. *All agencies and their published timetables including modalities bus, ferry, lightrail, metro, ferry and train given a departure time must be incorporatable in the journey planner.*

Network description and Timetable

The network consists of three trips, each of a different modality to test if the journey planner is capable to traverse different modalities. As the trips are from different modalities, each individual trip has a single linear timetable consisting of two stops. All trips are planned sequentially.



Synthetic Test

1. **depart** at 00:00 from stop 1 heading to stop 6.

Expected Result

1.

Depart	From		To	Arrive
00:01	Stop 1		Stop 2	00:02
00:03	Stop 3		Stop 4	00:04
00:05	Stop 5		Stop 6	00:06

Practical Test

1. **depart** at 12:09pm from Amsterdam, Hagedoornweg heading to Amsterdam, Sloterdijk.

Expected Result

1.

Depart	From		To	Arrive
12:10	Hagedoornweg		Buiksloterwegveer	12:12
-	Buiksloterwegveer		Amsterdam CS	-
12:27	Amsterdam CS		Amsterdam Sloterdijk	12:33

1b. *Under normal circumstances the journey planner should produce a valid travel advice within 5 seconds.*

For each static test in this testset we will evaluate the responsetime of the journey planner. The responses should always be less than 5 seconds.

1c. *When calamities occur, the journey planner should produce a valid travel advice within 30 seconds.*

For dynamic tests 3b, 3c, 3d, 3e, 3f, 3g and 3h we will evaluate the responsetime of the journey planner. The responses in these test must always be given within 30 seconds.

1d. *The journey planner must under any condition reply to a request.*

Any request done in this testsuite must not abort the testsuite.

1e. *The journey planner must guaranteed an uptime of 99.6%.*

At most 0.4% of the request to the jourey planner, may fail.

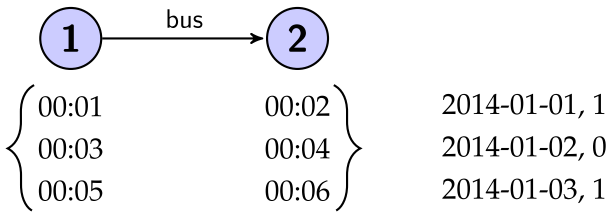
1f. *The planner reports in in all circumstances a valid traveladvice.*

All tests must succesfully reply with a valid travel advice. The definition of a "valid travel advice" is impossible to formalize. Section II describes tests that explore the quality of travel advices.

1g. *The journey planner is capable to optimise for a target arrival and departure time, and is able to plan on different operating days.*

Network description and Timetable

The network consist of three trips, each of the same route and planned sequentially. The timetable is valid for two operating days, and has an operating day without service in the middle. We test if the journey planner is capable to select the expected trip based on arrive and a depart query for the operating day with service. Additionally we check the result of the journey planner when a trip is requested on the operating day without service.



Synthetic Tests

1. on 2014-01-01 **depart** at 00:02 from stop 1 heading to stop 2.
2. from stop 1 heading stop 2 **arrive** at 00:03 on 2014-01-01.
3. on 2014-01-02 **depart** at 00:03 from stop 1 heading to stop 2.
4. from stop 1 heading stop 2 **arrive** at 00:04 on 2014-01-02.
5. on 2014-01-03 **depart** at 00:03 from stop 1 heading to stop 2.
6. from stop 1 heading stop 2 **arrive** at 00:04 on 2014-01-03.

Expected Results

1.

Date	Depart	From	To	Arrive
2014-01-01	00:03	Stop 1	Stop 2	00:04

2.

Date	Depart	From	To	Arrive
2014-01-01	00:01	Stop 1	Stop 2	00:02

3.

Date	Depart	From	To	Arrive
2014-01-03	00:01	Stop 1	Stop 2	00:02

4.

Date	Depart	From	To	Arrive
2014-01-01	00:05	Stop 1	Stop 2	00:06

5.

Date	Depart	From	To	Arrive
2014-01-03	00:03	Stop 1	Stop 2	00:04

6.

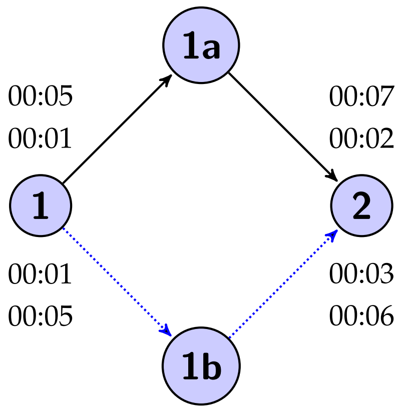
Date	Depart	From		To	Arrive
2014-01-03	00:03	Stop 1	🚌	Stop 2	00:04

B Dynamic transit planning using departure or arrival stops

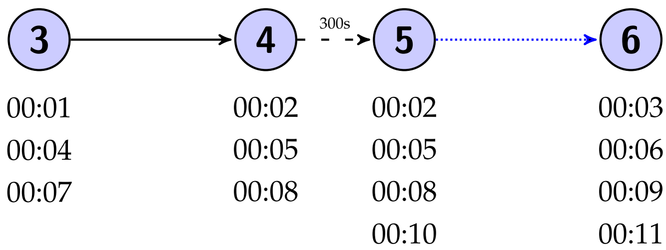
2a. *The journey planner must optimise for shortest travel duration and include transfer times in its calculation.*

Network description and Timetable

We describe a network consisting of four stops, and two routes, the first route travels via the north, the second via the south. The routes both have a different time demand type during the operating day, hence their travel duration between the departure and arrival stops is different during the day.



The second network for this test consists of two routes which require some transfer time. Due to the transfer time it is not possible to board the first and second trip between stop 5 and 6. The only possible option is to board the first trip between stop 3 and 4, transfer and board the third trip between stop 5 and 6.



Synthetic Tests

1. **depart** at 00:01 from stop 1 heading to stop 2.

2. **depart** at 00:03 from stop 1 heading to stop 2.
3. **depart** at 00:01 from stop 3 heading to stop 6.
4. **depart** at 00:02 from stop 3 heading to stop 6.
5. from stop 3 heading to stop 6 **arrive** at 00:11.

Expected Results

1.

Depart	From		To	Arrive
00:01	Stop 1	🚌	Stop 2	00:02

2.

Depart	From		To	Arrive
00:05	Stop 1	🚌	Stop 2	00:06

3.

Depart	From		To	Arrive
00:01	Stop 3	🚌	Stop 4	00:02
00:08	Stop 5	🚌	Stop 6	00:09

4.

Depart	From		To	Arrive
00:04	Stop 3	🚌	Stop 4	00:05
00:10	Stop 5	🚌	Stop 6	00:11

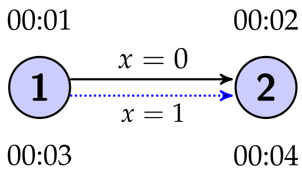
5.

Depart	From		To	Arrive
00:04	Stop 3	🚌	Stop 4	00:05
00:10	Stop 5	🚌	Stop 6	00:11

2b. *The journey planner should allow personalisation of the result prioritising vehicle attributes such as seats availability, (wheelchair) accessibility, toilets, WiFi, etc.*

Network description and Timetable

The network consists of one route and two trips. The trip attribute x is available for the vehicle of the second trip.



Synthetic Test

1. **depart** at 00:01 from stop 1 heading to stop 2, wants $x = 1$.

Expected Result

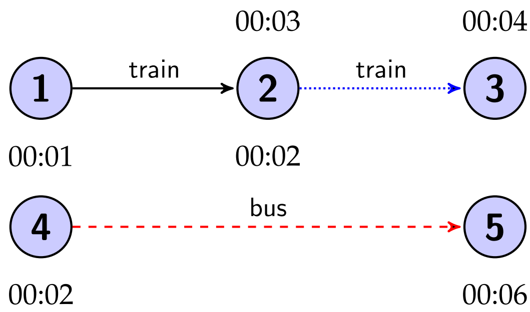
1.

Depart	From		To	Arrive
00:03	Stop 1	🚌	Stop 2	00:04

2c. *The journey planner allows to personalise for least transfers and preferred modalities.*

Network description and Timetable

This network consist of three routes. Both start points (stop 1 and 4) and end points (stop 3 and 5) are the same stop area. The two train routes including the transfer at two is slightly faster than taking the bus. The test will evaluate if the planner prioritises modaliy and least transfers over shortest arrival time.



Synthetic Tests

1. **depart** at 00:01 from stop 1 heading to stop 3.
2. **depart** at 00:01 from stop 1 heading to stop 3, prefer bus.
3. **depart** at 00:01 from stop 1 heading to stop 3, prefer least transfers.

Expected Results

1.

Depart	From	To	Arrive
00:01	Stop 1	Stop 2	00:02
00:03	Stop 2	Stop 3	00:04

2.

Depart	From	To	Arrive
00:02	Stop 4	Stop 5	00:06

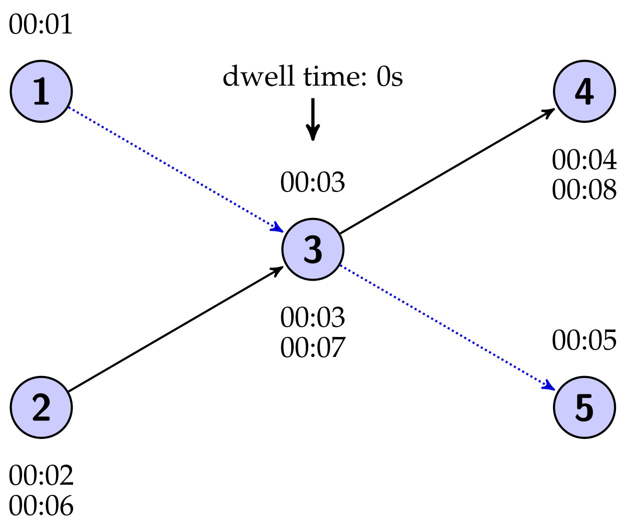
3.

Depart	From	To	Arrive
00:02	Stop 4	Stop 5	00:06

2d. *The journey planner uses stop-to-stop transfers in its advice.*

Network description and Timetable

Stop-to-Stop transfers can be found at stations and stopplaces. Typically this means that there is should be time reserved to alight and board between a trip departing at the same stop place. The dwell time for the transfer is defined, or can be reduced to zero if enough time is available to make the transfer.



Synthetic Tests

1. **given** a default dwell time of 60 seconds and a specified dwell time of 0 seconds at stop 3, **depart** at 00:01 from stop 1 heading to stop 4.

Expected Results

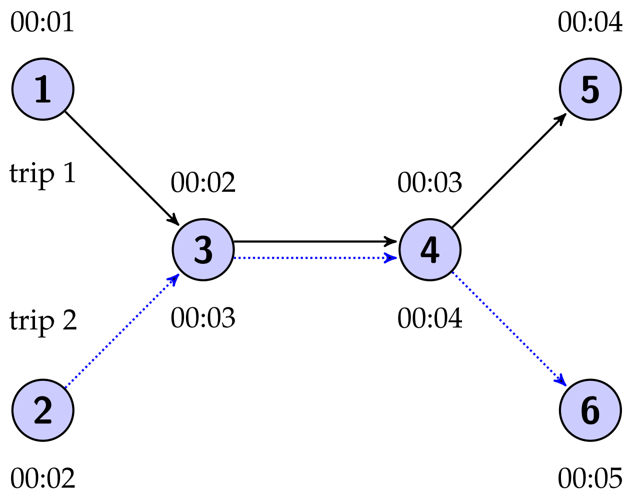
1.

Depart	From	To	Arrive
00:01	Stop 1	Stop 3	00:03
00:03	Stop 3	Stop 4	00:04

2e. *The journey planner uses trip-to-trip transfers in its advice.*

Network description and Timetable

Trip-to-trip transfers allow the definition of preferred transfers that may be guaranteed by the operator. In a dynamic scenario a trip-to-trip transfer is guaranteed as if the last arriving trip was in time, so commuters can make the transfer. This has realtime prediction implications which may delay the waiting trip.



Synthetic Tests

1. **given** a *preferred* transfer from trip 1 to trip 2 at stop 3, **depart** at 00:01 from stop 1 heading to stop 6.
2. **given** a *preferred* transfer from trip 1 to trip 2 at stop 4, **depart** at 00:01 from stop 1 heading to stop 6.
3. **given** a *forbidden* transfer from trip 1 to trip 2 at stop 3, **depart** at 00:01 from stop 1 heading to stop 6.
4. **given** a *forbidden* transfer from trip 1 to trip 2 at stop 4, **depart** at 00:01 from stop 1 heading to stop 6.

Expected Results

1.

Depart	From	To	Arrive
00:01	Stop 1	Stop 3	00:02
00:03	Stop 3	Stop 6	00:05

2.

Depart	From	To	Arrive
00:01	Stop 1	Stop 4	00:03
00:04	Stop 4	Stop 6	00:05

3.

Depart	From	To	Arrive
00:01	Stop 1	Stop 4	00:03
00:04	Stop 4	Stop 6	00:05

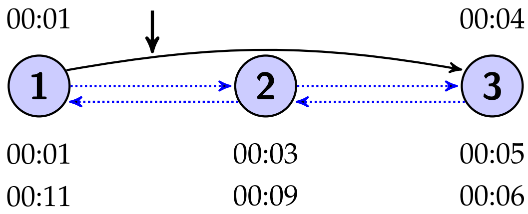
4.

Depart	From	To	Arrive
00:01	Stop 1	Stop 3	00:02
00:03	Stop 3	Stop 6	00:05

2f. *The journey planner is capable to produce a pre-trip advice (stop to stop) and an on-trip advice based on current location to the last stop.*

Network description and Timetable

We define a network of three routes, an intercity route between two stations, passing by a third station in the middle. A local train is calling at all three of the stations and operates in both directions. The user queries at the edge of the network between the first and second stop, while being on the intercity train.



Synthetic Tests

1. **depart** from trip 1 heading stop 2.

Expected Results

1.

Depart	From	To	Arrive
*	*	Stop 3	00:04
00:06	Stop 3	Stop 2	00:09

* The initial departure time and stop is open to the planner to fill in. The trip MUST be mentioned though.

C Planned and unplanned maintenance and disruptions

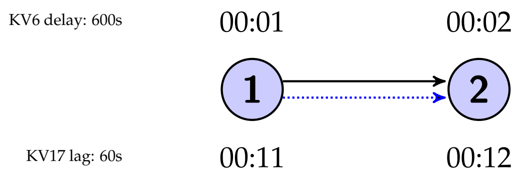
3a. *The journey planner is capable to process planned changes in the regular publications automatically.*

The ability to automatic load KV1 files is guaranteed using this test-set.

3b. *The journey planner is capable to process unplanned changes in the regular publications automatically.*

Network description and Timetable

The network consists of two stops, with a ten minute interval service, we present two trips. The first trip has an initial delay of 10 minutes, the second trip has an intial lag of one minute. The test determines which trip is prefered.



Synthetic Tests

1. **depart** at 00:01 from Stop 1 heading Stop 2.
2. **depart** at 00:11 from Stop 1 heading Stop 2.

Expected Results

1.

Depart	From		To	Arrive
00:01 +10m	Stop 1	🚌	Stop 2	00:02 +10m

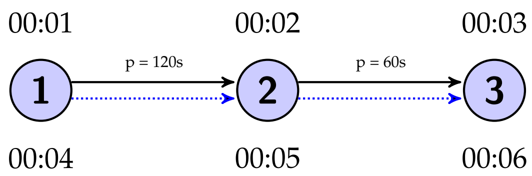
2.

Depart	From		To	Arrive
00:01 +10m	Stop 1	🚌	Stop 2	00:02 +10m

3c. *The journey planner is capable use changes within the travel advice, which may lead to a different travel advice.*

Network description and Timetable

The network consists of three stops and two trips. The first trip punctuality changes in a punctuality, while the second trip is in time.



Synthetic Tests

1. **depart** at 00:04 from Stop 2 heading Stop 3.

Expected Results

1.

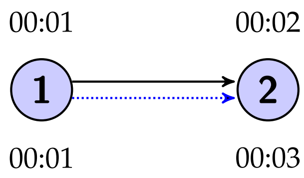
Depart	From		To	Arrive
00:02 +2m	Stop 2	🚌	Stop 3	00:03 **+2m**

*Note: keep in mind, that while the punctuality may reduce after stop 2, it is not yet known to the journey planner, the **+2m** in the table may be reduced by a natural decay of the journey planner, we assume naive propagation.*

3d. *The journey planner is capable of excluding routes from travel advice.*

Network description and Timetable

The network consists of two stops, and two routes. The first route is the fastest but is excluded.



Synthetic Tests

1. **depart** at 00:01 from Stop 1 heading Stop 2 exclude route 1.

Expected Results

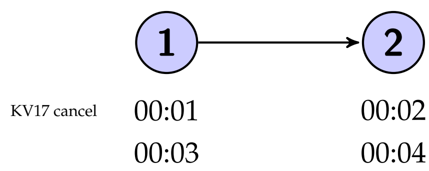
1.

Depart	From		To	Arrive
00:01	Stop 1		Stop 2	00:03

3e. *The journey planner is capable of excluding trips from travel advice.*

Network description and Timetable

The network consists of two stops, and two routes. The first trip is is canceled by KV17, therefore it cannot be planned.



Synthetic Tests

1. **depart** at 00:01 from Stop 1 heading Stop 2 exclude route 1.

Expected Results

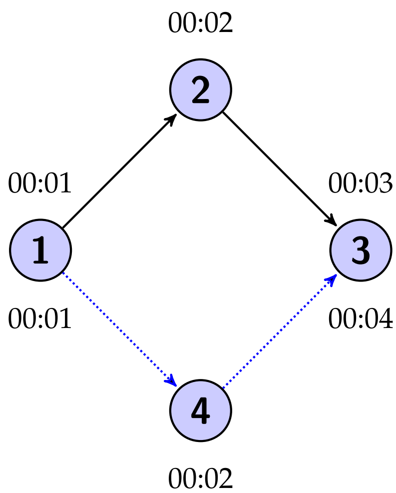
1.

Depart	From		To	Arrive
00:03	Stop 1		Stop 2	00:04

3f. *The journey planner is capable of excluding stop places from travel advice.*

Network description and Timetable

The network consists of four stops, and two routes. The first route travels via the north, the second via the south. The we do not want to pass through the North station.



Synthetic Tests

1. **depart** at 00:01 from Stop 1 heading Stop 3 exclude Stop 2.

Expected Results

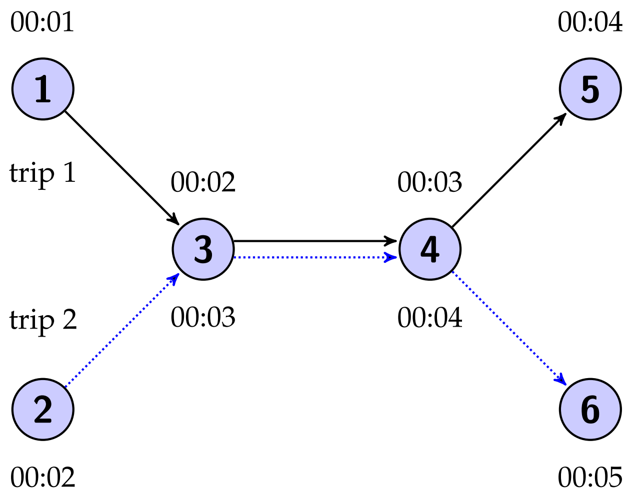
1.

Depart	From		To	Arrive
00:01	Stop 1 (via Stop 4)	🚂	Stop 3	00:04

3g. *The journey planner is capable of excluding stops from travel advice.*

Network description and Timetable

In normal trip planning the planner would choose a place to alight and board trips based on preference of the operator (trip-to-trip), or an algorithm choose. Especially at night not all stops might qualify to wait a bit for the next trip. We exclude stops we do not want to alight and/or board from and allow this dynamic unpreferred transfer.



Synthetic Tests

1. **given** a *unpreferred* transfer from trip 1 to trip 2 at stop 3, **depart** at 00:01 from stop 1 heading to stop 6.
2. **given** a *unpreferred* transfer from trip 1 to trip 2 at stop 4, **depart** at 00:01 from stop 1 heading to stop 6.

Expected Results

1.

Depart	From		To	Arrive
00:01	Stop 1	🚋	Stop 4	00:03
00:04	Stop 4	🚋	Stop 6	00:05

2.

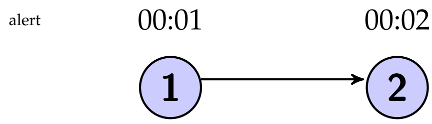
Depart	From		To	Arrive
00:01	Stop 1	🚋	Stop 3	00:02
00:03	Stop 3	🚋	Stop 6	00:05

3h. *The journey planner must produce a valid travel advice when dynamic information is provided. It must arrive at the best departure stop given the shortest total travel time.*

3i. *The journey planner should show if the planner incorporated dynamic information regarding calamities in the travel advice.*

Network description and Timetable

The network consists of two stops, with a ten minute interval service, we present one trip. This trip has received an service alert regarding calamities related to it. The test determines whether this alert is communicated inside the travel advice itself.



Synthetic Tests

1. **depart** at 00:01 from Stop 1 heading Stop 2.

Expected Results

1.

Depart	From		To	Arrive
00:01	Stop 1	🚌*	Stop 2	00:02

* This trip should contain the original alert in it's data.

D Forcasting and prediction

These test cases describe functionality on layer 2, the data layer. The current test harnas is limited to testing layer 3, the algorithmics layer. Future versions of the testset may improve in this area.

E Pre– and posttransit transportation

Only the transit network is currently in scope for the MMRI project. The requirements of this section are not tested.

II Informative tests

A Tests concerning the definition of a "valid travel advice"

1a. *How does a planner react to conflicting constraints?*

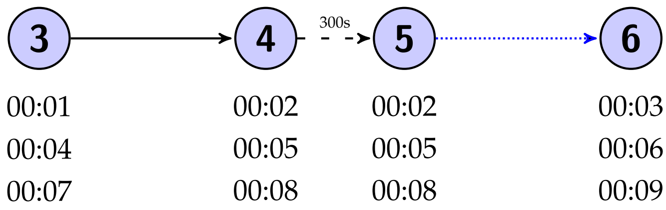
Network description and Timetable

The network for this test consists of two routes which require some transfer time. Due to the transfer time it is not possible to board the first and second trip between stop 5 and 6. The only possible option is to board the first trip between stop 3 and 4, transfer and board the third trip between stop 5 and 6. It's similar to test 2a, except with the difference that there's no fourth trip to choose from between stops 5 and 6, this could result in several scenario's:

1. *The planner doesn't return an itinerary, as there's no valid itinerary, due to the transfer demand between stops 4 and 5 and the lack of trip to follow up.*
2. *The planner only returns a partial itinerary, until stop 4 or 5, as that's as far as it can bring the traveler.*
3. *The planner returns an itinerary that departs earlier than reqeusted, but does bring the traveler at the destination (in the expected results below)*
4. *The planner returns an itinerary on the next day (for this the test data should also contain this data)*

Synthetic Tests

1. **depart** at 00:02 from stop 3 heading to stop 6.
2. from stop 3 heading to stop 6 **arrive** at 00:09.



Expected Results

1.

Depart	From		To	Arrive
00:01	Stop 3	bus	Stop 4	00:02
00:02	Stop 4	walk	Stop 5	00:07
00:08	Stop 5	bus	Stop 6	00:09

2.

Depart	From		To	Arrive
00:01	Stop 3	bus	Stop 4	00:02
00:02	Stop 4	walk	Stop 5	00:07
00:08	Stop 5	bus	Stop 6	00:09