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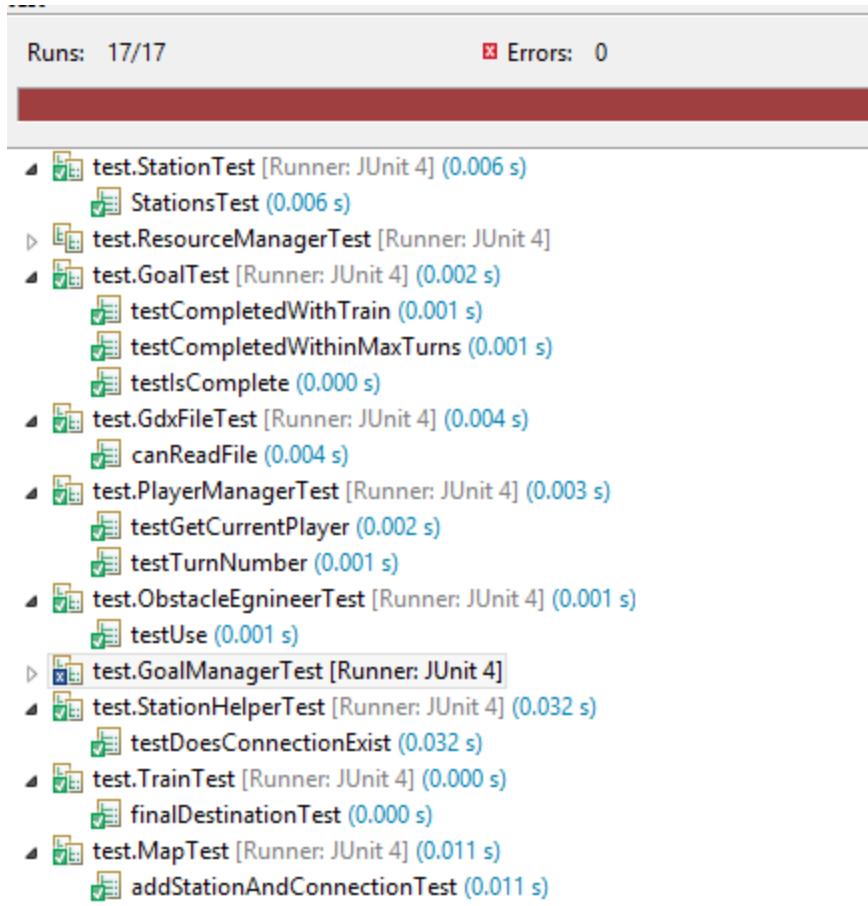
4 - Evaluation

1- Regression Testing - 23/04/2015

EVS Unit tests

Modifications were made to fit with new code base function was generally kept the same.

A lot of the tests also had to be adapted to work with code modifications.



Test ID	Test name	Test Description	Result
1	testInitialisePlayers	Assert that the current player has both goals and resources	Pass
2	testPlayerChanged	Get number of resources and goals of current player. End turn twice to return to initial player. Assert that number of resources and goals has increased	Pass
3	testGetCurrentPlayer	Get current player then end turn.	Pass

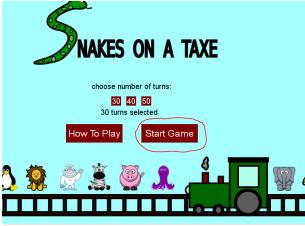
		Assert that new player is not equal to the new current player	
4	testDoesConnectionExist	<p>Use a connection between two stations that does exist and assert that it does.</p> <p>Use a connection between two stations that does not exist and assert that it doesn't</p>	Pass
5	canReadFile	<p>Pass a json file to the file handler</p> <p>Assert a statement about the length of the file</p>	Pass
6	goalManagerTest	<p>Create a train and two stations</p> <p>Create a goal for moving a train between these stations</p> <p>Create a route for the train between these stations</p> <p>End turn twice</p> <p>Assert that goal has been completed.</p>	Failed Replaced by DUS Goal Tests
7	testTurnNumber	<p>Store the value of the turn number</p> <p>End turn</p> <p>Assert that the current turn number is greater than previous turn</p>	Pass
8	stationsTest	<p>Create a test station at a specific point on the map</p> <p>Assert that the station location is equal to the specified point</p> <p>Assert that the station name is equal to the name assigned for it</p>	Pass
9	finalDestinationTest	<p>Create two stations</p> <p>Add these stations to a route</p> <p>Assert that the route contains two stations</p> <p>Assert that the second station is the final destination in the route</p>	Pass
10	addStationAndConnectionTest	<p>Get number of current stations on map</p> <p>Create two new stations</p> <p>Assert that number of stations has increased by two</p> <p>Add connection between two new stations</p>	Pass

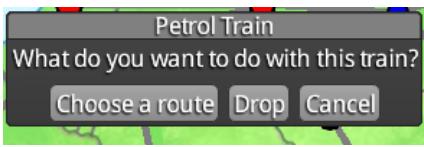
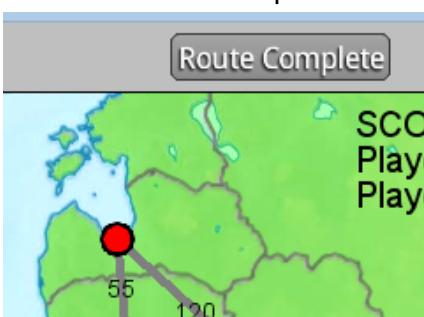
		Assert that connection exists between the new stations	
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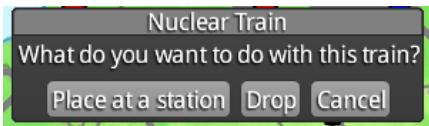
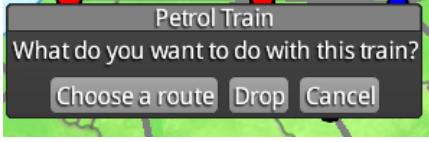
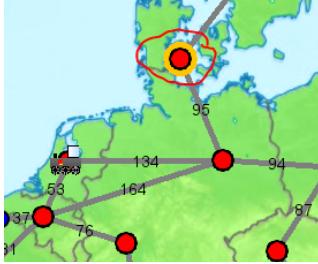
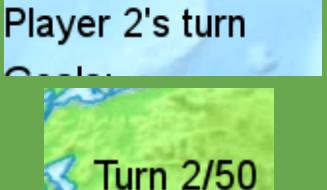
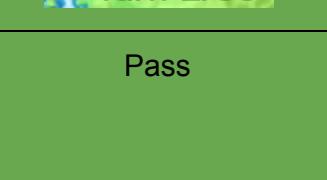
DUS Unit Tests

Test ID	Test name	Test Description	Result
11	testCompletedWithinMaxTurns	Creates a Goal with a turn limit and tests that it functions correctly.	Pass
12	testCompletedWithTrain	Checks the goal was completed by a specific train.	Pass
13	testIsComplete	Checks goal completion to replace goal manger tests	Pass
14	testUse (Obstacle)	Creates 2 stations and an obstacle between them then tests if the route between them is blocked	Pass
15	testUse(Engeneer)	Uses an engineer on a piece of blocked track then asserts that it is no longer blocked.	Pass

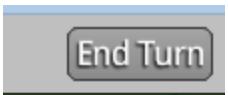
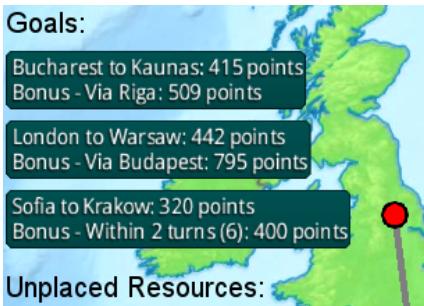
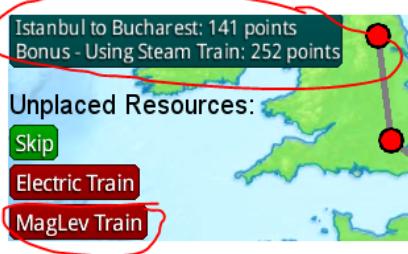
System Testing - FVS/DUS Tests (adapted and rerun)

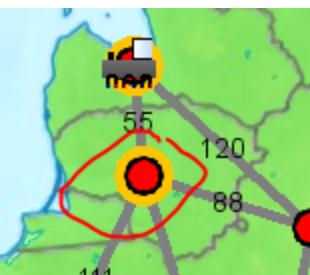
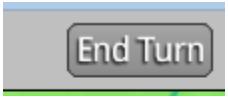
Test ID	Test Description	Steps	Expected	Result	Test Changes
1	Starting the game	<ul style="list-style-type: none"> On the splash screen the start game button is pressed 	Game map is shown with player one turn underway.	 Pass	New start screen same test.
2	Placing a resource	<ul style="list-style-type: none"> Select a train from the inventory 	The station now shows	Pass	None needed.

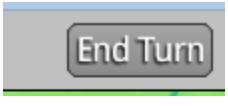
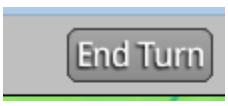
		<ul style="list-style-type: none"> Click place at station  <ul style="list-style-type: none"> Select a station on the map 	that one train resides there.		
3	Planning a route	<ul style="list-style-type: none"> Click on a city with a train  <ul style="list-style-type: none"> Select choose a route  <ul style="list-style-type: none"> Click on the city/cities in the order you wish to visit  <ul style="list-style-type: none"> Click on route complete  <ul style="list-style-type: none"> Select 'View Route' 	Train route displays on the map.		Trains route now displays. Just GUI changes

4	Dropping a resource	<ul style="list-style-type: none"> Click on the train you want to drop  <ul style="list-style-type: none"> Click drop 	Train is no longer in list of resources.	<p>Pass</p> 	None needed.
5	Notify user when connection doesn't exist	<ul style="list-style-type: none"> Place, select a train and then select 'choose a route' as in test 3  <ul style="list-style-type: none"> Click on a station not directly linked to the origin station 	Connection does not exist error message.	<p>Pass</p> 	None needed.
6	Time progresses when turn ends	<ul style="list-style-type: none"> Press end turn button 	Turn number has been incremented.	<p>Pass</p> 	None needed.
7	Completing a goal	<ul style="list-style-type: none"> Select the appropriate route for the train to complete the goal 	User notified of goal completion.	<p>Pass</p> 	None needed.

	<p>Copenhagen to Rome: 640 points Bonus - Within 5 turns (6): 880 points</p> <p>End Turn</p>		<p>SCORES Player 1 : 0 Player 2 : 640</p>
8	<ul style="list-style-type: none"> Start the game and receive initial resources and goals <p>Unplaced Resources: MagLev Train Bullet Train</p>	<p>Players receives no more goals past 3 and Players receives no more resources past 7.</p>	<p>Pass</p> <p>Player 1's turn Goals:</p> <ul style="list-style-type: none"> Bucharest to Kaunas: 415 points Bonus - Via Riga: 509 points London to Warsaw: 442 points Bonus - Via Budapest: 795 points Sofia to Krakow: 320 points Bonus - Within 2 turns (6): 400 points <p>Unplaced Resources:</p> <ul style="list-style-type: none"> MagLev Train Bullet Train Steam Train MagLev Train Skip Electric Train Bullet Train

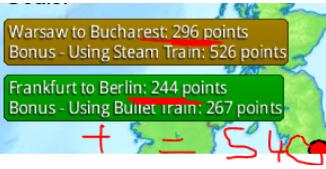
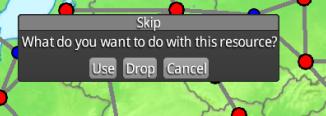
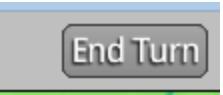
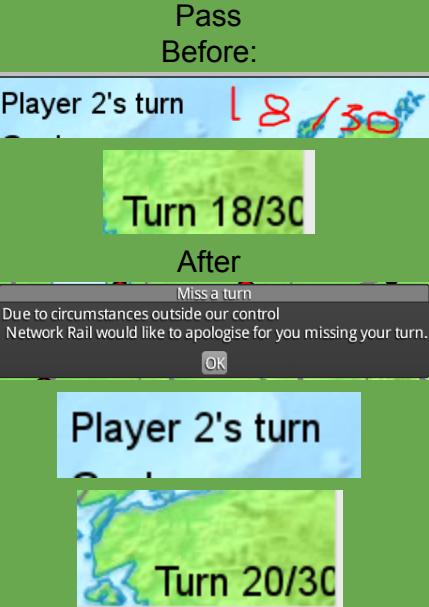
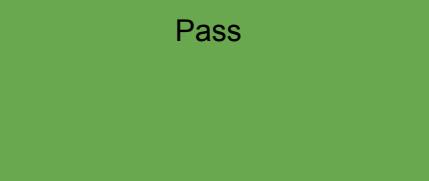
		<ul style="list-style-type: none"> End turn repeatedly to increase player resources and goals  <ul style="list-style-type: none"> Once number of goals = 3 end turn twice <p>Goals:</p> <p>Bucharest to Kaunas: 415 points Bonus - Via Riga: 509 points</p> <p>London to Warsaw: 442 points Bonus - Via Budapest: 795 points</p> <p>Sofia to Krakow: 320 points Bonus - Within 2 turns (6): 400 points</p> <p><u>Unplaced Resources:</u></p>  <ul style="list-style-type: none"> Once number of resources = 7 end turn twice 		
9	Goal must be completed with correct train (when specified)	<ul style="list-style-type: none"> Select the wrong train for the given goal  <ul style="list-style-type: none"> Select the appropriate route for the train to complete the goal End turn to progress time until train completes route 	*Bonus* Goal is not completed.	 <p>Changed to accommodate bonus feature of goals.</p>
10	Adding multiple trains to stations	<ul style="list-style-type: none"> Select a train and add it to a station with a train 	'2' is displayed above the station on the map and the	 <p>None needed.</p>

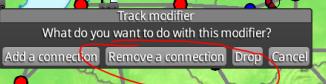
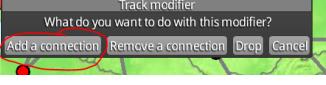
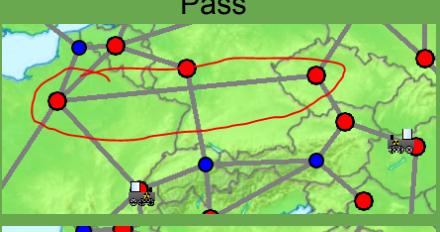
		<ul style="list-style-type: none"> Click the station 	two trains are listed.		
11	Viewing opponents train at a station	<ul style="list-style-type: none"> Select a station which has trains owned by the other player  <ul style="list-style-type: none"> Click on the other players train 	Can see but not interact with the train	Pass	None needed.
12	Train and goal removed after goal completion	<ul style="list-style-type: none"> Select the appropriate route for the train to complete the goal  <ul style="list-style-type: none"> End turn to progress time  <ul style="list-style-type: none"> Until train completes route 	Goal removed, train no longer at station and train's route removed.	Pass	Route of train is removed when goal completes.
13	Game can be won	<ul style="list-style-type: none"> Complete a goal for a player End turn to progress time until game ends 	Game winner is displayed	Pass	Repeated for both players

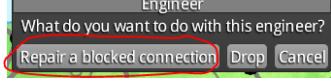
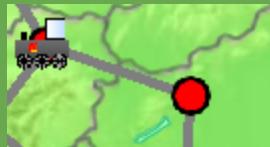
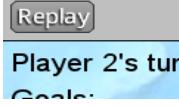
					
14	Game can be drawn	<ul style="list-style-type: none"> End turn to progress time until game ends 	Game shows "no winner"		Removed goal completion steps as with weighted scoring the game would not end in a draw often.
15	Train collision	<ul style="list-style-type: none"> Route a train through a junction  <ul style="list-style-type: none"> Route another train through the same junction such that they will both reach the junction at the same time  <ul style="list-style-type: none"> End turn to progress time until trains meet 	Trains disappear and notification is displayed		Graphic used to notify player of the collision

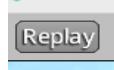
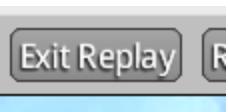
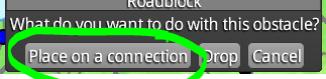
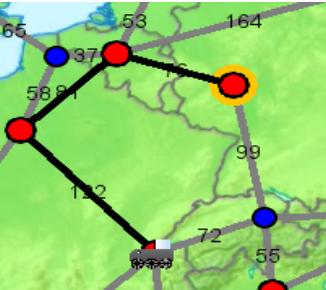
2 - System Testing - PIK Tests - 23/04/2015

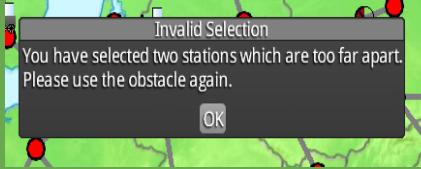
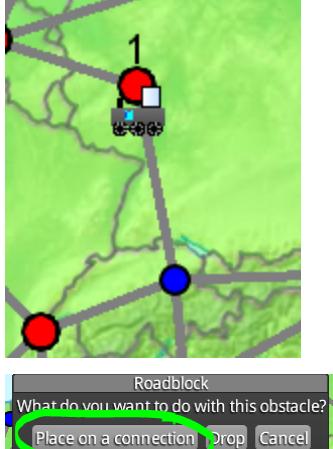
Test ID	Test Description	Steps	Expected	Result
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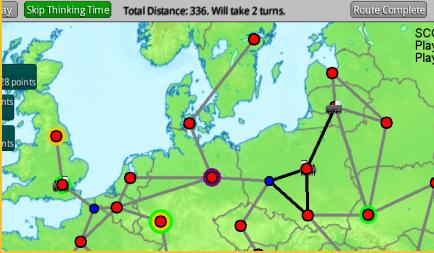
1	Score board	<ul style="list-style-type: none"> Start game Complete 2 goals for each player (as in test 7) 	<p>Scores displays correctly for each player</p>	
2	Skip the opponents turn	<ul style="list-style-type: none"> Cycle through until a skip resource is allocated  <ul style="list-style-type: none"> Select it then select 'Use'  <ul style="list-style-type: none"> End Turn 	<p>Skip resource should disappear.</p> <p>The turn count should be incremented by 2</p> <p>Next Player should miss their turn</p>	
3	Remove a connection	<ul style="list-style-type: none"> Complete a goal as one player then cycle through until a player receives a modifier 	<p>Track disappears and connection doesn't exist displays</p>	

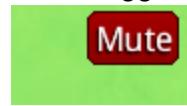
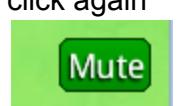
		<p>ELECTRIC TRAIN</p> <p>Modifier</p> <p>Petrol Train</p> <ul style="list-style-type: none"> Select 'Remove Track' and the track you wish to remove.  <ul style="list-style-type: none"> Try to create a trains route over the missing track 		<p>This connection doesn't exist</p> 
4	Add a connection	<ul style="list-style-type: none"> Complete a goal as one player then cycle through until a player receives a modifier <p>ELECTRIC TRAIN</p> <p>Modifier</p> <p>Petrol Train</p> <ul style="list-style-type: none"> Next select add a connection and choose cities to connect   <ul style="list-style-type: none"> Create a trains route over the new track 	<p>Train passes over new Track without issue</p>	  <p>Small issue that the track overlaps but this is purely graphical and hard to calculate. It has no effect on game play.</p>

5	Train speeds show correctly	<ul style="list-style-type: none"> Hover over a Train in the inventory 	Details on the trains speed are displayed.	Pass
6	Repair a connection with engineer	<ul style="list-style-type: none"> Cycle through until a player receives a 'Engineer' and cause an obstacle  <ul style="list-style-type: none"> Select Repair a Blocked Connection  <ul style="list-style-type: none"> Select the Connection 	Obstacle should be removed	 Pass
7	Replay two turns	<ul style="list-style-type: none"> Complete two basic turns  <ul style="list-style-type: none"> Then select replay and watch  <ul style="list-style-type: none"> Pause during a trains movement then resume 	Events should occur exactly as before in realtime apart from the pause	Pass

8	Replay a game at faster than normal time	<ul style="list-style-type: none"> Complete at least 20 diverse and complex turns then select replay  <ul style="list-style-type: none"> Now toggle 'Skip thinking time' on and off at random intervals  <ul style="list-style-type: none"> Finally exit the replay 	The game should speed up and slow down but still return to the same state on exit	Pass
9	Place an Obstacle	<ul style="list-style-type: none"> Wait for a player to receive an Obstacle resource  <ul style="list-style-type: none"> Place it in front of an enemy trains route  	Train should stop and wait until the obstacle goes	  

10	<p>Attempt to add very long track</p> <ul style="list-style-type: none"> Complete a goal as one player then cycle through until a player receives a modifier  <ul style="list-style-type: none"> Select stations on opposite sides of the map 	<p>Error message displays.</p>		
11	<p>Place obstacle on track with train</p> <ul style="list-style-type: none"> Wait for a player to receive an Obstacle resource  <ul style="list-style-type: none"> Place it on a piece of track with a train in transit 	<p>Train should carry on through</p>		
12	<p>A mix of trains are allocated to the player</p> <ul style="list-style-type: none"> End turn until inventory is full 	<p>Both players should have a random but relatively balanced selection of trains and resources..</p>		<p>Pass</p>

				
13	Trains cannot pass over broken junctions	<ul style="list-style-type: none"> Causes a junction failure like in test 15 Try and plan another train route over the junction 	Can not pass through this station for a number of turns.	
14	Attempt to place trains and resources during the replay		In game changes should not be made in replay mode or at least after exit they should be reverted	 <p>Bug</p> <p>Every player action such as train placement and using resources is fully functional in replay mode you can also interact with trains in the replay! Although some changes are reverted on exit which would be acceptable many are not completely and have strange side effect.</p> <p>eg. using the trains of the final player removes them and while they do return he then cannot deploy them on his next turn.</p>

				While funny and major it is not a critical issue to gameplay as its out of normal playing scope.
15	Test other turn limits	<ul style="list-style-type: none"> Select a different number of turns and then start game  <p>Choose the number of turns: 30 40 50 50 turns selected</p> <p>How To Play Start Game</p> <p>Turn 50/50</p> <ul style="list-style-type: none"> Cycle through that number of turns 	Game should complete but only after the chosen number of turns.	 <p>Pass</p>
16	Test instruction screen	<ul style="list-style-type: none"> Select how to play  <p>choose number 30 40 30 turns se</p> <p>How To Play</p>	Instructions screen should display	 <p>Pass</p>
17	Music	<ul style="list-style-type: none"> Start Game and select 'Mute' toggle  <ul style="list-style-type: none"> Wait 30 seconds and click again 	Music should play for thirty seconds and then stop.	 <p>Pass</p>

3 - Unit Tests - PIK Tests 24/04/2015

Test ID	Test name	Test Description	Result
1	replyGiveGoalTest	Gives a goal to the first player records the number of goals that player has. Next replay is played. and it is asserted that the number of goals has not increased.	Pass
2	addRemoveConnectionTest	Used to test the backends of track modification a connection is added to the map. Then assert connection exists. Next remove the same connection, and assert that the connection no longer exists.	Pass

4 - Evaluation

Its worth noting DUS's other system tests were ran and all passed as part of regression testing but did not fit our testing model and did not all cover the functional requirements of the spec. they were deemed redundant and there results were not documented. Instead they were replaced with cleaner tests where necessary.

Bug Fixes -

ID	Test Description	Bug	Fix	Retest
14	Attempt to place trains and resources during the replay	Actions can still be carried out in replay mode.	Whenever a button is clicked it checks if the	Pass 26/04/2015 5

			game is in replay mode or not. If it is no action is carried out.	
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In comparison to previous assessments we have found much fewer bugs in the final testing phase, despite a very similar testing strategy. I also genuinely feel our deliverable seems most stable.

I think this is likely due to a renewed focus on test driven development in this cycle so most kinks were ironed out before they became an issue. Hopefully this is also a sign, as a team, of learning stronger programming skills as the project has progressed.