# Homework: Software Quality Assurance Introduction

## Think Testing: Gas Station

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| **Problem #1** | Depending on the car technical specs:   1. The woman forgot her key in the gas station. 2. The woman tried to start the car with the wrong key. 3. The woman put the wrong type of fuel. 4. The man filling up the car had used the wrong type of fuel. 5. The fuel cap of the car hasn’t been closed properly. 6. The car battery has gone too low to start the engine. 7. Just any specific technical issue of the car makes it unable to start. |
| **Problem #2** | Depending on the woman’s condition   1. The woman has tried to start another car. 2. The woman is unable to start the car properly – forgot how to OR got sick in some way. |
| **Problem #3** | Depending on external forces:   1. Specific electro (magnetic) field prevents the car to start. 2. Storm / Flood has drenched part of the car. |

## Think Testing: Tooth Brushing

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| **Step #1** | 1. **Explanation – with words, pictures and/or videos and preparation.** 2. What is the purpose of the task – why and when do we do it. 3. What and where the objects to be used – toothpaste, toothbrush, sink with tap and clean water, cup, towel, step and mirror (if needed), are. |
| **Step #2** | 1. **Provide instructions** 2. Wet the toothbrush with water. 3. Open the toothpaste. 4. Squeeze the amount of pea grain of the toothpaste on the head of the toothbrush. 5. Close and return the toothpaste to its place. 6. Brush teeth on the out and inside, with circular motions for two minutes. 7. Clean the toothbrush with water and put it back to its place. 8. Rinse your mouth with clean water and spit out in the sink. 9. Wipe mouth with towel. |

## Think Testing: 5 Kg Bag

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| **Test #1** | Check if the given object is truly a grocery shopping paper bag – visually and with touch – does it have handles (if needed by specification), does it have bottom and sides, is the material paper. |
| **Test #2** | Check capacity with under 5 kilos of some ordinary grocery products – apples, rice or bottles.  *“Check” means verifying whether bag is still usable - handles are intact, bottom and sides is not torn apart; AND groceries are not spoiled - after getting them out of the bag, they have the same qualities as before putting them in the bag AND all groceries are still in the bag (there aren’t any small holes in the bag).* |
| **Test #3** | Check the same with exactly 5 kilos – provide accurate (certified if needed) scales. |
| **Test #4** | Check capacity with more than 5 kilos of same grocery products. |
| **Test #5** | Check capacity with different types of groceries – many small heavy / light ones (walnut, lead beads), one big and heavy (watermelon), something with sharp or pointy edges, something long that is sticking out of the bag, something wet, something hot, something cold (which might condensate and wet the paper bag). |
| **Test #6** | Check capacity with different ways of carrying the bag – swing, vibrate, throw, and drop on the floor (additional details for repeatability will be provided). |

## Login Form UX Problems

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| **Problem #1** | Technical specification of the desired look of the web site is missing. Therefore all marked issues below are pointed out on the QA engineer’s expectations and assumptions basis. |
| **Problem #2** | Positioning issues:   1. “Password” field is above “Username or Email Address”. 2. “Lost you password?” text is not aligned with the “Username or Email Address” field and maybe should be somewhere at the bottom. 3. “Log in” button maybe should be at the center, or rightmost position, aligned with the “Username or Email Address” field. 4. “Remember Me” field maybe should be somewhere below “Password” field. |
| **Problem #3** | Misspellings and font:   1. “Remember Me” should be “Remember me” 2. “Log In” should be “Log in”. 3. “Email Address” should be “Email address”. 4. “your-wonderful-shop” should be “my-wonderful-shop”. 5. Font of all text should be one and the same – currently “Lost you password?” looks different. |
| **Problem #4** | Logical issues:   1. In a login form there’s no need for “Log out” button. 2. There isn’t option for creating new account. 3. The address should not be “add-to-basket”, but something like „log-in”. 4. Missing title text. |
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## Weather Forecast Bug

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| **Mistake** | The developer made the following mistake:  The developer didn’t consider that the weather forecast temperature comes in °F and is being displayed in °C. He did not use the formula for conversion from Fahrenheit to Celsius.  Example: min temp: 46 degrees  should be min temp: 7.7. |
| **Bug (location)** | The bug in the code should be in the module / function, responsible for: Displaying the obtained information from the external source. |
| **Failure (symptoms)** | When the buggy code goes in production, it fails as follows: Shows wrong data with too high temperature in Celsius. |

## Age Checking Machine

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| The mistake (error) in the above logic is that there’s no definition of what happens if the person is exactly 18 years old.  The second condition for entering the bar should be:  If **age >= 18**, then **print** "*Welcome to our bar. Enjoy!*" and the door opens.   1. Additionally, there probably should be condition when an underage person has come with a chaperone – he/she should be allowed to enter the bar. 2. Secondly, there’s no certainty the ID card belongs to the person trying to enter, or that it is not a fake. 3. Lastly, there’s no definition what should happen if the machine can’t read the ID card. Fix:   If **age cannot be read**, **print** "*Age cannot be read*". The door stays closed.  Wrong logic of the code is called a bug, or a defect in the code.  The result, if we run the code, which implements the wrong logic, will be failure of the system (deviation of desired behavior). |

## Testing an Electric Water Kettle

Make sure the appliance you are given is truly an electric water kettle – by look and touch.

Make sure there is **only water** in the kettle – no hard, melting, sponge like or any other objects in it.

Make sure there’s electricity in the testing environment and +/- 10% typical voltage (220 V) .

Make sure you have all additional objects you may need to run the tests of the kettle:

* Proper hard horizontal surface to put the kettle on;
* Thermometer;
* Stopwatch;
* Proper socket for the electrical network;
* Measurement cup;
* Watt meter (e.g. shelly plug s)

### Test Scenario #1: Boil water

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| Test case #1 | **Boil 1 liter of initially cold water  success** |
| Description | Pour 1 liter of cold water, close the lid if open, start the kettle, and wait until it gets hot. |
| Steps | 1. Fill 1 liter of cold water in the kettle and close the boiler lid. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait until the water gets boiling hot and the kettle automatically switches off (2-3 minutes). |
| Expected results | The boiling process should be completed in less than 4 minutes.  The water should get hot (boiling).  The kettle should automatically power off when the water gets too hot.  The kettle lid should stay closed. |

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| Test case #2 | **Boil an (almost) empty kettle  fail** |
| Description | Try to boil an (almost) empty kettle (no water, or less than 0.2l inside) and make sure the boiling stops (automatically switches off) almost immediately after starting. |
| Steps | 1. Fill 0.1 liter of cold water (or empty it) in the kettle and close the boiler lid. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait until the kettle automatically switches off (0.5-2 seconds). |
| Expected results | The kettle should automatically power off after 0.5-2 seconds.  The kettle lid should stay closed. |

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| Test case #3 | **Boil 1 liter of initially cold water with open lid  success** |
| For this one additional specification of expected behavior might be needed (may be this test should fail). | |
| Description | Pour 1 liter of water, open the lid if closed, start the kettle and wait to see if it starts. |
| Steps | 1. Fill 1 liter of cold water in the kettle and open the boiler lid. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait to see if kettle starts. |
| Expected results (as in specification) | **Unsafe**! The user might get burnt.  The kettle will start working and boiling process will occur.  The kettle lid should stay open. |
| Expected results (possible) | There should be no boiling process.  The water should not get hot (boiling).  The kettle should not start at all.  The kettle lid should stay open. |

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| Test case #4 | **Boil 1.2 liter water  success** |
| For this one additional specification of expected behavior might be needed (may be this test should fail). | |
| Description | Pour 1.2 liter of water, start the kettle and wait to see if it starts. Since capacity of the kettle is 1.0 liter, it will overflow and the power base will be flooded. In this case the kettle should not start working. |
| Steps | 1. Fill 1.2 liter of water in the kettle. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait to see if kettle starts. |
| Expected results (as in specification) | **Unsafe**! The user might get electrified.  The kettle will start working and boiling process will occur. |
| Expected results (possible) | There should be no boiling process.  The water should not get hot (boiling).  The kettle should not start at all. |

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| Test case #5 | **Boil 1 liter of initially hot water  success** |
| Description | Pour 1 liter of hot water, close the lid if open, start the kettle and wait until it gets hot. |
| Steps | 1. Fill 1 liter of hot water in the kettle and close the boiler lid. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait until the kettle automatically switches off (0.5-2 seconds). |
| Expected results | The whole process should be completed in less than 3 seconds.  The water should stay hot.  The kettle should automatically power off in 0.5-2 seconds.  The kettle lid should stay closed. |

### Test Scenario #2: Lid test

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| Test case #1 | **Open the lid** |
| Description | Open the lid with the mechanical button. |
| Steps | 1. Press the mechanical button to open the lid. |
| Expected results | The lid should remain open until manually closed. |

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| Test case #2 | **Close the lid** |
| Description | Close the lid with the mechanical button. |
| Steps | 1. Press the mechanical button to close the lid. |
| Expected results | The lid should remain closed until opened with the mechanical button only. |

### Test Scenario #3: Power base test

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| Test case #1 | **Power base heats without kettle on it  fail** |
| Description | Check if the power base starts heating in case of missing kettle on it. |
| Steps | 1. Plug the power base in the electrical network. 2. Wait to see if it heats up without putting the kettle on it. |
| Expected results | The power base should not heat up without kettle on it. |

### Test Scenario #4: Power off while working

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| Test case #1 | **Power off the kettle (pressing the switch on button) while boiling water  success** |
| Description | Check if the power base starts heating in case of missing kettle on it. |
| Steps | 1. Fill 1 liter of cold water in the kettle and close the boiler lid. 2. Plug the power base in the electrical network. 3. Put the kettle on the power base. 4. Switch on the kettle. 5. Wait approximately 1 min until the water gets hot, nut before boiling and press the switch on/off button 6. Wait to see if the kettle switches off. |
| Expected results | The kettle should switch off. |

### Test Scenario #5: Check power consumption

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| Test case #1 | **Check the kettle capacity  1500 watt** |
| Description | Boil 1 liter of water and check if consumed power is 1500 watt |
| Steps | 1. Repeat all steps from Boil water. 2. Use watt meter to determine how much the consumed power is.   **0** watt when **off**  **1400-1600** watt when **on** |
| Expected results | Measured power consumption is approximately 1500 watt. |

**N.B. As a default expected result the kettle should hot have broken during the process (remain intact, no leakage, no melted parts) AND the qualities of the water (apart from getting boiling hot 100°C) should remain unchanged AND the surrounding environment has not been spoiled in any way.**

## Testing a Coffee Machine

Make sure the appliance you are given is truly a coffee machine – by look and touch.

Make sure there is **only water** in the water container and only grounded coffee in the coffee outlet.

Make sure there’s electricity in the testing environment and +/- 10% typical voltage (220 V).

Make sure you have all additional objects you may need to run the tests of the coffee machine:

* Proper hard horizontal surface to put the coffee machine on;
* Thermometer;
* Stopwatch;
* Proper socket for the electrical network;
* Measurement cup.
* Coffee cup.
* Grounded coffee.

May want to ask for further details of the technical specification, regarding what must happen in case:

* Water container is not put correctly.
* The person using the machine cannot hear the beeping.
* Water in water container is less than needed quantity for a short coffee.
* Old coffee grounds are not removed after brewing coffee.
* The coffee machine has not been cleaned for a long period of time – any of the holes of the coffee outlet is blocked, or there’s any other technical issue of the machine, preventing it to brew coffee (or just provide hot water)
* There’s too little amount of coffee in the coffee outlet.

We presume that “hot enough” water means between 92°C and 96°C.

We presume that “enough water” is at least 60 ml.

### Test Scenario #1: Brew Coffee

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| Test case #1 | **Brew a small coffee 🡪 success** |
| Description | Start the coffee machine, pour enough water, put ground coffee in the outlet, and brew a cup of coffee. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container to its max level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The coffee cup should hold a hot small coffee (60 ml).  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should have enough water in its water container (it should not beep). |

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| Test case #2 | **Brew a long coffee 🡪 success** |
| Description | Same as above |
| Steps | Same as above apart from point 6. – it should be “brew large coffee” |
| Expected results | Same as above, apart from small coffee – it should be large. |

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| Test case #3 | **Brew coffee without water 🡪 fail** |
| Description | Start the coffee machine, empty the water container, try to brew a cup of coffee, expect the coffee machine to start beeping to indicate that the water is not enough. |
| Steps | 1. Empty the water container if there’s water in it. 2. Switch on the coffee machine. 3. Put coffee in the outlet. 4. Press any of the buttons for brewing coffee. 5. Wait to hear the beeping until machine is switched off or water tank is filled with enough water. |
| Expected results | The machine should start beeping and no coffee should appear. |

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| Test case #4 | **Brew small coffee with less than 60 ml of water 🡪 fail (if no further specification provided)** |
| Description | Start the coffee machine, pour 50 ml (or less) in the water container, try to brew a cup of coffee, expect the coffee machine to start beeping to indicate that the water is not enough. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container below its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The coffee cup should not hold a hot small coffee (60 ml) – it would be less.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should not have enough water in its water container (it should beep). |

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| Test case #5 | **Brew coffee with water above max level 🡪 success (if no further specification provided)** |
| Description | Same as brewing a large coffee, but pour water above max level to see if the machine will make coffee. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container above its max level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The coffee cup should hold a hot small coffee (60 ml).  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should have enough water in its water container (it should not beep).  May be there should be some message for attention not to fill over max level for danger of overflowing and electrifying oneself. |

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| Test case #6 | **Brew coffee without coffee 🡪 fail (if no further specification provided)** |
| Description | Start the coffee machine, pour enough water in the container, and try to brew a cup of coffee, expect the coffee machine to start brewing, but no coffee to leak out of the coffee outlet. |
| Steps | 1. Do not put / Take out ground coffee blend in the coffee outlet (if there’s any left in the outlet – empty it). 2. Fill the water container above its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The coffee cup should not hold any coffee, but some other liquid.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should have enough water in its water container (it should not beep). |

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| Test case #7 | **Brew coffee without removing used coffee grounds 🡪 success (if no further specification provided)** |
| Description | Start the coffee machine, pour enough water in the container, do not put fresh ground coffee in the outlet and try to brew a cup of coffee, expect the coffee machine to start brewing, but not coffee should leak out of the coffee outlet. |
| Steps | 1. Do not put / Take out fresh ground coffee blend in the coffee outlet – leave previously used dose in. 2. Fill the water container above its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The coffee cup should not hold hot coffee, but some other type of liquid.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should have enough water in its water container (it should not beep). |

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| Test case #8 | **Brew coffee with water container not put correctly 🡪 fail (if no further specification provided)** |
| Description | Start the coffee machine, pour enough water in the container, put the water container in a wrong position (unstable, not in its socket) and try to brew a cup of coffee, expect the coffee machine not to brew coffee. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container above its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Readjust the position of the water tank so it stands lopsided. 7. Press the "brew small coffee" button. 8. Wait to see if the brew process starts. |
| Expected results | The brew process should not start at all.  The coffee cup should not hold any coffee.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  May be there should be some message for attention to put the water container in the right way. |

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| Test case #9 | **Brew coffee with coffee outlet not put correctly 🡪 fail (if no further specification provided)** |
| Description | Start the coffee machine, pour enough water container, put the coffee outletin a wrong position (unstable, not in its socket) and try to brew a cup of coffee, expect the coffee machine not to brew coffee. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container above its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Readjust the position of the water tank so it stands lopsided. 7. Press the "brew small coffee" button. 8. Wait to see if the brew process starts. |
| Expected results | The brew process should start in less than 4-5 minutes.  The coffee cup should not hold any coffee.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  May be there should be some message for attention to put the coffee outletin the right way. |

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| Test case #10 | **Brew coffee without a cup 🡪 success (if no further specification provided)** |
| Description | Start the coffee machine, pour enough water, put ground coffee in the outlet, and brew a cup of coffee. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container to its max level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Do not put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. Wait until the brew process finishes. |
| Expected results | The brew process should complete in less than 50 seconds.  The machine should stay powered on.  The "hot water" indicator light could be on or off (both states are correct).  The machine should have enough water in its water container (it should not beep).  The machine should have produced small coffee.  May be there should be some message for attention to put a cup with sufficient volume. |

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| Test case #11 | **Brew a coffee when the water is not hot enough 🡪 fail** |
| Description | Start the coffee machine, fill the water container to the mid level, try to brew a cup of coffee and try to brew coffee before the "**hot water indicator light**" is **on.** |
| Steps | 1. Power on the machine. 2. Put ground coffee blend in the coffee outlet. 3. Fill the water container above its min level. 4. Do not wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button in less than 5 seconds after pushing the power ON button. 7. Wait to see if the brew process starts. |
| Expected results | The brew process should not start at all.  The coffee cup should not hold any coffee.  The machine should stay powered on.  After approximately 5 seconds the "hot water" indicator light could be on. |

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| Test case #12 | **Brew coffee when the power OFF button is pressed during brewing 🡪 fail** |
| Description | Start the coffee machine, fill the water container to the mid level, press any of the brew buttons, wait for brewing to start and switch the machine off. |
| Steps | 1. Put ground coffee blend in the coffee outlet. 2. Fill the water container above its min level. 3. Power on the machine. 4. Wait until the "hot water" indicator lights up. 5. Put an empty coffee cup under the coffee outlet. 6. Press the "brew small coffee" button. 7. After brewing starts (approximately 25 seconds) push the power on/power off button in off position. 8. Wait to see if the brew process stops. |
| Expected results | The brew process should stop when the machine is switched off.  The coffee cup should not hold the desired amount of coffee.  The machine should be powered off. |

### Test Scenario #2 Provide hot water

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| Test case #1 | **Switch on with water 🡪 “hot water indicator light" is on** |
| Description | Start the coffee machine, put water and wait until the "hot water indicator light" is on. |
| Steps | 1. Wait until **“hot water indicator light" is on** |
| Expected results | **“Hot water indicator light"** should not be off in more than 3-4 minutes. This means that the coffee machine has heated the water in less time than that. |

**N.B. As a default expected result the coffee machine should hot have broken during the process (remain intact, no leakage, no melted parts) AND the surrounding environment has not been spoiled in any way.**