

# INF-2310 Assignment 1

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## 1 Problem 1

The Fjellhuset Parking garage in the tunnel downtown Tromsø has automatic gates that, by default, are positioned to block vehicles at the entrances and exits.

The entry gate lifts to allow passage of a car only if (i) a car is stopped in front of the entry gate, (ii) a time-stamped ticket has then been generated by a machine located near the driver's side of that car, and (iii) that time-stamped ticket is removed from the machine. After the gate lifts and a car is no longer stopped in front of the gate, then the gate returns to blocking the entrance.

The exit gate lifts to allow passage of a car when a car is stopped in front of the exit gate and a validated time-stamped ticket is inserted into a machine located near the driver's side of that car. After the gate lifts and there is no longer a car stopped in front of the gate, then the gate returns to blocking the exit.

The driver uses a vending machine located on the various exits, as follows, in order to obtain a validated a ticket: The driver inserts the time-stamped ticket received at the entry gate, inserts the requested payment amount (calculated based on the elapsed time since the car entered), and then removes the validated ticket. Parking between 09:00 and 20:00 is charged at 12NOK per hour. Parking during other times is free.

**Question 1.1)** security properties is this system enforcing? For each property, discuss whether it is confidentiality, integrity, or availability.

**Answer:**

- The system is enforcing a security property that involves payment and sensitive information about the user credit/visa card in payment. The user of the parking space trust that the sensitive information is not abused by the owners of the system.
- This property falls under the CIA-properties of confidentiality which is a measure that strives to prevent sensitive information from unauthorized access attempts
- By using this system the user trusts that the system is accurate, trustworthy and consistent, which is an integrity policy. The user trusts that the clock on all the machines are accurate and aligned so that he is not charged to much for the time he has parked.
- Availability ensures that only authorized cars (meaning cars which have entered the gate) can access the parking. If a car enters the parking during free-parking hours and leave during free parking hours, it does not pay anything. Otherwise, the person needs to pay for the time parked during payment-hours, even it the person leaves during free-hours.

**Question 1.2)** A suggestion has been made to eliminate the entry gate and instead to post a sign that tells drivers to take a ticket. The rationale: drivers are being told that a validated ticket is required for exit and, therefore, they have an incentive to collect the time-stamped ticket at the entry. Do you recommend that this suggestion be implemented? Explain.

**Answer:**

We do not recommend this type of solution because it allows a driver to exploit the system by taking a

time-stamped ticket when they want. This means that the driver can take a ticket just before he leaves and will therefore pay less than he is supposed to.

**Question 1.3)** A suggestion has been made to alter the entry gate so that it works as follows:  
The entry gate lifts to allow passage of a car only if:

- a button is pushed on a machine located near the driver's side of that car,
- a time-stamped ticket has then been generated by that machine, and
- that time-stamped ticket is removed from the machine. After the gate lifts and a car passes by the gate, then the gate returns to blocking the entrance.

Do you recommend that this suggestion be implemented? Explain?

**Answer:**

This solutions only difference from the the case in problem 1.1 is that there is an button to activate the generation of a time-stamped ticket. We assume that the original problem 1.1 have a sensor which registers that a car is close to the gate, compared to a the physical solution of a button in this case (1.3).

This two solutions is a discussion of whether the sensor or the button in any way can be misused to "falsely" access the parking facility and/or misused to pay less for the parking. The buttons weakness is that it only needs to be manually clicked by a person and does not check if there is a car parked in-front of the gate. This opens up for possibilities for missuses of the payment system.

On the other hand, the sensor requires higher levels of precision and accuracy to accurately detect that there is a car in front of it. For example, it must not issue a time-stamped ticket if there is a bicycle parked in front of it. If a sensor solution is available, then we would not recommend this "button-based" solution. The reason is that there are several ways to exploit this system.

**Question 1.4)** A suggestion has been made to have the entry and exit gates transition into the raised position (so vehicles pass unimpeded) between 20:00 and 09:00. Do you recommend that this suggestion be implemented? Explain?

**Answer:**

We do not recommend this solution because this allows a car to be parked inside the parking hall when the gates transition into a closed position. In this case there will be a parked car inside with no time-stamped ticket and may eventually stay there for free for as long as the driver wants. This is an example of how a button-based solution can be misused, if the gates were open, the person could only retrieve a ticket when the gates have gone down, and then get out of the parking facility only paying for a short period parking.

## 2 Problem 2

These days, airline passengers are searched for bombs and other potentially dangerous material. But it is too costly to search every passenger, so sampling is employed. There is a design choice about who gets selected for searches:

1. Select randomly among all passengers.
2. Select passengers satisfying certain predefined profiles.

Adopt (1) and you end up searching babies, grandmothers, and congressman; adopt (2) and you might only search males of a certain age and ethnicity.

**Question 2.1** Given a fixed budget for performing searches, which of (1) and (2) is likely to be more effective at decreasing the chances of successful future terrorist attacks on airplanes. Justify your answer.

**Answer:**

We believe that option 1 is more likely to decrease the chances of future terrorist attacks. There are several reasons we believe this

- Terrorists cannot be placed in advance into a category of gender, ethnicity, age, orientation, religion and so on. (We call this the passenger profile).
- If word got out about the airport security only a certain predefined profile then the terrorists would seek to avoid looking like this profile or recruit profiles of this type.
- The key point with totally random search is that there are no patterns in which the terrorist can exploit weaknesses in the selection of controls.

### 3 Problem 3

In an attempt to eliminate "fake news", the U.S. Congress is debating a law that would require any news stories posted on the web to include a tag that gives the name and address of a person who vouches for the authenticity of that story.

-A web site that posts stories without such tags or with unauthenticated tags would be fined.

-An individual who submits a "fake news" story for posting would be fined.

**Question 3.1** Discuss ways in which the proposed law might have undesired consequences.

**Answer:**

- An undesired consequence of this law is that people with information about true events may avoid to report this because sensitive information is made public due to this reporting. Fear of one's own physical and digital safety is also a reason one might want to avoid to post information.
- This system could be exploited by posting information with a different person's identity and hence performing identity theft and maybe cause harm to another person.
- People with, for example, political agendas can "buy up" people who are willing to deviate from the truth as witnesses in order to have the news verified as a "truth", motivated by political agendas.

**Question 3.2)** Discuss ways in which the law might be modified to eliminate undesired consequences.

**Answer:**

- To eliminate the consequence of sensitive information being made available to the public because of reporting. We suggest that this information is not made public, but that a directive is created with responsibility for authentication of reporters, this directive can verify whether this news is true or not, but keeps the identity of the reporter secret from the public.
- A possible solution to the identity theft problem is that a person has to be logged in to a website to be allowed to post information. Still there would be a vulnerability to be hacked and still post information in another person's name.
- Lying about news and uncovering that people have been bought up to verify a news story is difficult to eliminate. The only solution we can come up with is that this must be prosecuted and investigated continuously.