Complex Event Processing - Assignment III - Group 15

Task 1

1.
The use case belongs to the category „**dynamic operational behavior**“. Depending on the students lecture schedules, the number of students currently in the lecture rooms and the weather conditions, the system will either plan or cancel trips. Each component of the system sends events (provides information) to other components of the system which then react to the received events.

2.
Stakeholders could for example be the **Students** who are using the buses and provide information about their lecture schedules, as well as the **university** which must ensure the transportation for the students. The company **municipal utilities** must be mentioned here as well because they provide the buses which are used by the students.

3. **& 4**.
The components of the target system are the subsystems that produce and consume events. These include a „**bus scheduling system**“ which will plan or cancel trips for specific routes and determine the size of the needed busses depending on the information it receives from other sub-systems. The „**lecture information system**“ sends information about how many students are currently in the lecture rooms and also general information about lecture times and sites. A „**web and / or mobile application**“ could be used by the students to provide information about their lecture schedules and if they are willing to take a bus to come from one lecture to another. The „**weather observing system**“ is used to provide information about current and future weather conditions, like the probability for rain or snow. Depending on that maybe more or less students will use busses to attend lectures. Last but not least there needs to be a „**bus availability system**“ at municipal utilities which will provide information about available busses at specific times and the size of the available busses.

5.
- The „**bus scheduling system**“ receives events from all other components and depending on that it sends requests for buses to the „**bus availability system**“. Those include the number and the size of the needed busses as well as the routes and the times. The system an also inform students about available buses, if the „**bus availability system**“ confirms specific bus requests. This could be done via the „**web and / or mobile application**“ for students.
- The „**web and / or mobile application**“ for students sends events about student schedules, and the preference to take busses to the „**bus scheduling system**“. It may receive information for scheduled busses.
- The „**lecture information system**“ sends general information about lectures taking place at specific sites on specific times to the „**bus scheduling system**“. Further more it incorporates the number of students which are currently in the lecture rooms. With that information the „**bus scheduling system**“ can estimate the number of needed busses for specific routes.
- The „**weather observing system**“ sends information about current and future weather conditions to the „**bus scheduling system**“. This information can influence the number of needed busses. For example, if it is rainy maybe more students will use a bus.
- The „**bus availability system**“ receives bus requests and will response to these either with a positive or a negative assignment of busses.

6.

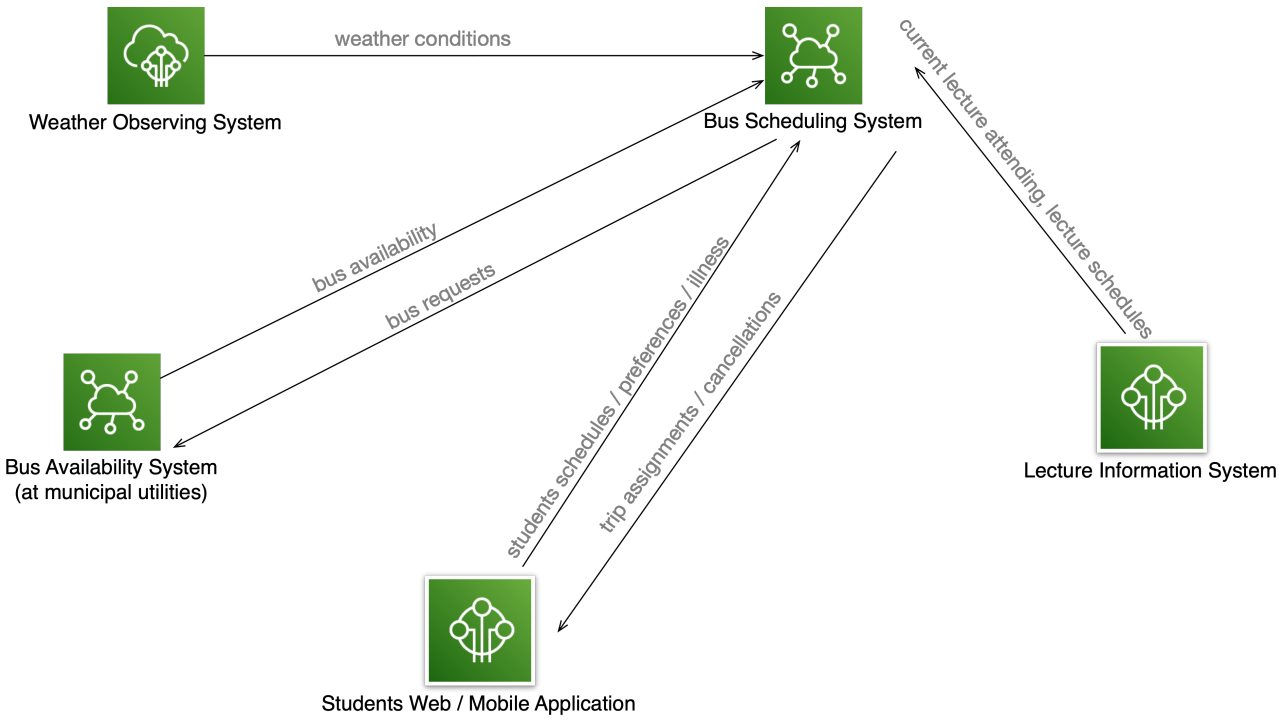
trip scheduling:
- information about availability of busses
- information about students lecture schedules and their personal intent to use a bus
- general lecture schedules and sites, as well as lecture times
- how many students are currently in specific lecture rooms (attending lectures)
- current and future weather conditions

Trip cancellation:
- information about buses not being available at specific times
- information about lectures which will not take place due to exceptional conditions (e.g. if the professor gets ill)
- current weather conditions
- holiday information (no trips on holidays or specific dates)
- information about students who are ill or will not attend lectures for other reasons

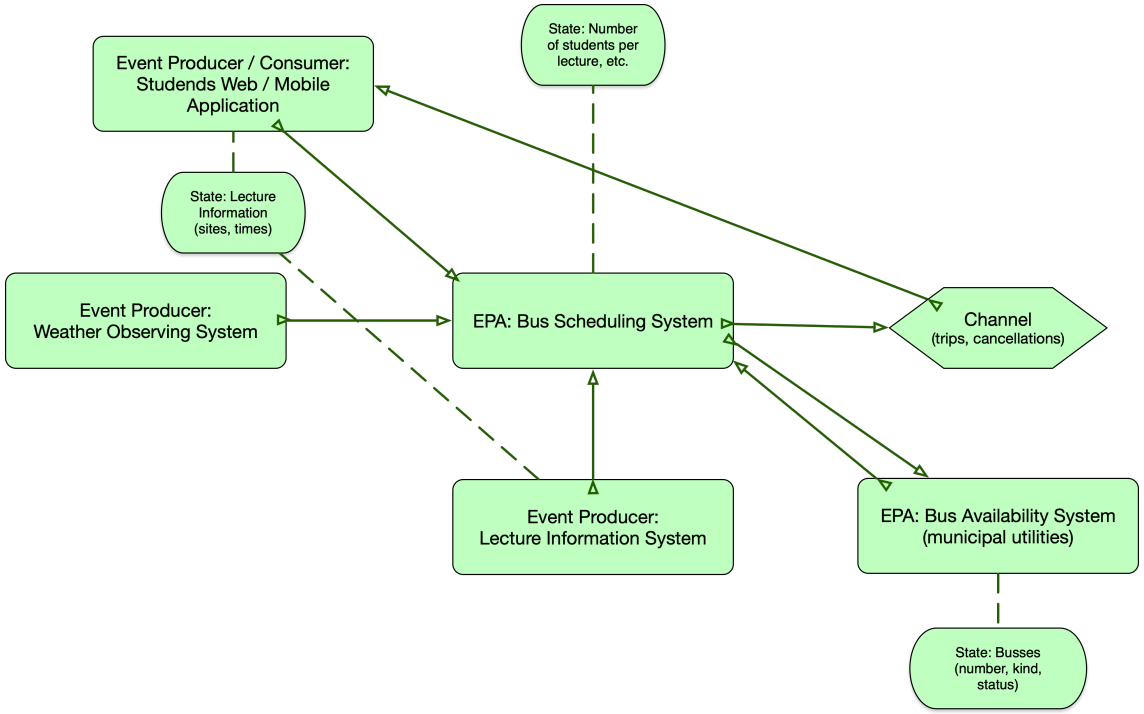
Number of students per trip:
- information about how many students are currently in the lecture rooms, the students schedules as well as the intent of the students to use a bus
- current weather conditions
- general information about how many students are enrolled in a course

7.
- **university stream** (general lecture sites and times, number of students currently in the lecture rooms)
- **student stream** (student schedules, personal intent, ill reporting)
- **bus stream** (number, times and sites for available busses)
- **weather stream** (current weather conditions)
- **trip stream** (trips that are executed, times and sites, trips cancellations)

8.



9.



10.

Pattern Type	**Context**	**Relevant Types**	**Parameters**	**Policies**	Intent
absence pattern	bus confirmation interval	bus_request_confirmation			trip is canceled because bus request is not confirmed within time (no bus available)
threshold	student cancelation interval for specific lectures (e.g. sickness)	student_cancelation	cancelations > enrolled_students * 0.8 (enrolled_students for a specific lecture comes from global state or unbounded count window)	evaluation = deffered	if the number of students canceling a lecture attendance is greater than 80% of students enrolled in the lecture, the trip to the lecture is cancelled

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