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## Information Systems 01PDWOV

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Books, notes are not allowed. Write only on these sheets.

### Movie theater tickets

Tickets for movie theaters can be bought at counters in the theater (AS IS situation).

A theater can have many screens, where different movies are shown at different times of the day.

The ticket is on paper, and has to be shown at a controller to enter the show. The controller tears the ticket to make it unusable for next entries.

More and more theaters allow buying the tickets online, to avoid lines.

Tickets can be purchased up to five days in advance. Customers can use a web site or an app on a smartphone to select movie and time, pay, and possibly change the selection. No paper tickets are used anymore in this case. However, paperless tickets bought online and paper tickets bought at counters must coexist.

Model the TO BE situation with paperless and paper tickets. Discuss how access to the show is controlled. Choose (and motivate why) between seat reservation or no seat reservation (the ticket is for a specific numbered seat or not).

### 1 IT Model / Technological model: describe the hardware architecture of the system

#### Client

Smartphone / pc for customer, employees

QR code scanner for access control

#### Server

Db with schedules and tickets

### 2 Organizational model: list roles or organizational units involved

#### Customer

#### Theater

Controller

Ticket sales

Schedule management

#### Payment system

### 3 Business rule: write (in plain English, or in pseudocode) a business rule at your choice from the process described above

Today – day\_of\_ticket\_purchase\_online >= 2  
(online purchase at least 2 days in advance of show)

#### 4 Functional model: Design and model (using BPMN + UML class diagram) the process (subdividing it as needed in subprocesses)

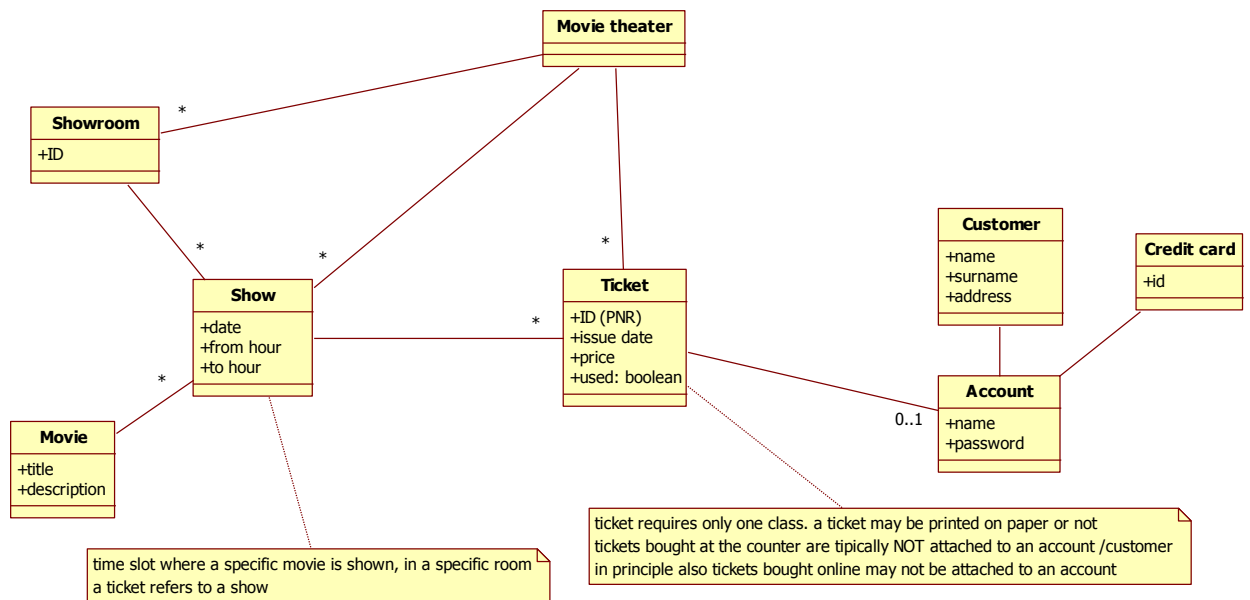
The choice is to have tickets not assigned to seats, to simplify the access of customers to the show. The downside is not allowing seat reservations (and possibly different prices in function of better / worst seat).

It is essential to avoid two processes (for paper ticket, digital ticket – both for purchase and for control).

The solution is the same as for train / airplane tickets. The ticket is digital (it is a number with a boolean state used/not used), but it can be printed to make it usable as a paper ticket.

Online purchase ends with a digital ticket that does not need to be printed. Purchase at the counter follows the same process, but in the end the clerk prints the ticket (i.e. the digital code is printed as a qr code). Also, at the counter payment can be made cash.

Control of the ticket requires a qr code scanner, that works both on qr code printed on paper, or displayed on a screen. Also the manual option is possible (a person checks the ticket on paper and then tears the piece of paper). However this option is inconvenient, it requires the customer to print the ticket (even if the purchase is made online) and allows fake tickets / reuse of tickets.



Processes needed

Core

Purchase ticket (online, at counter)

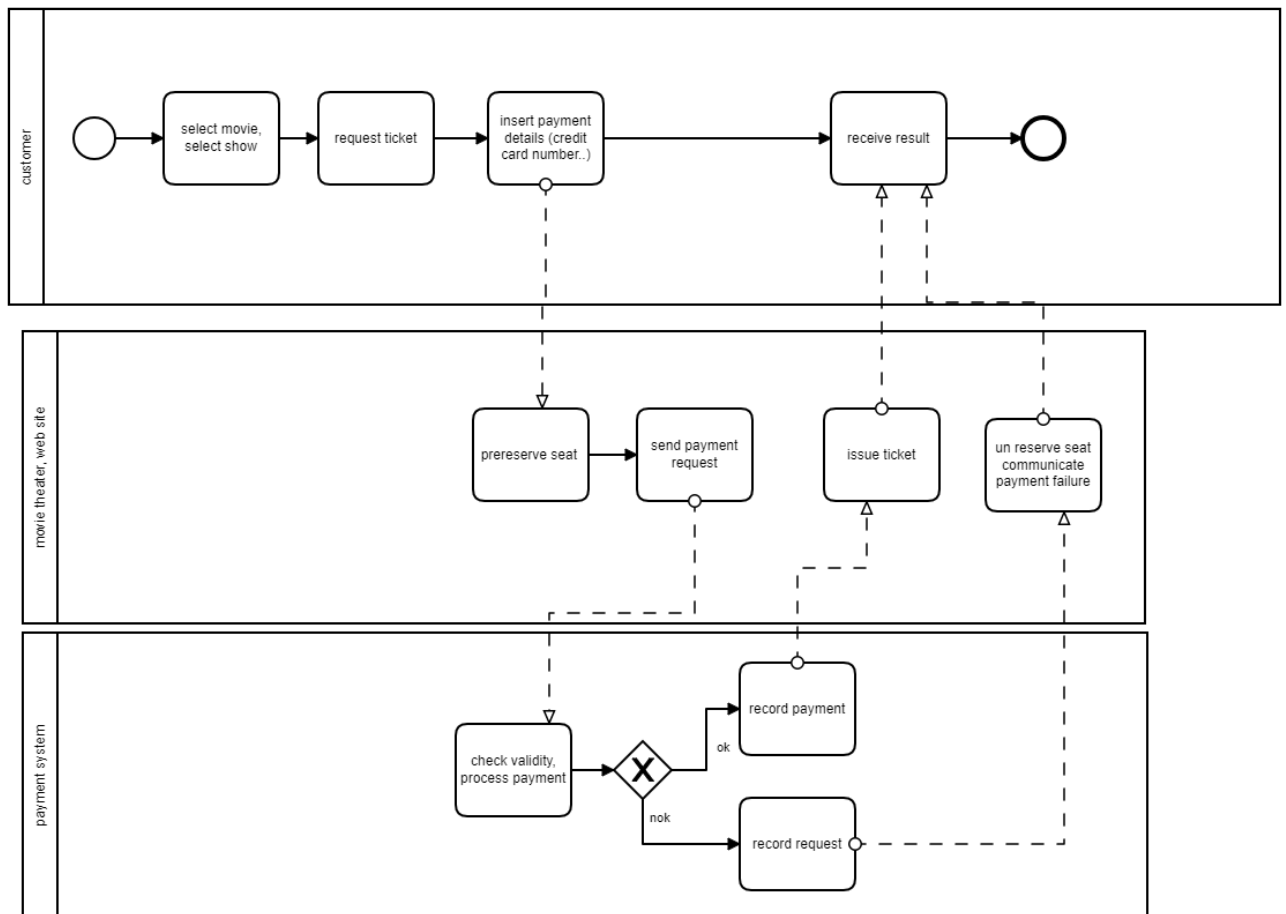
Access control

Define / modify shows

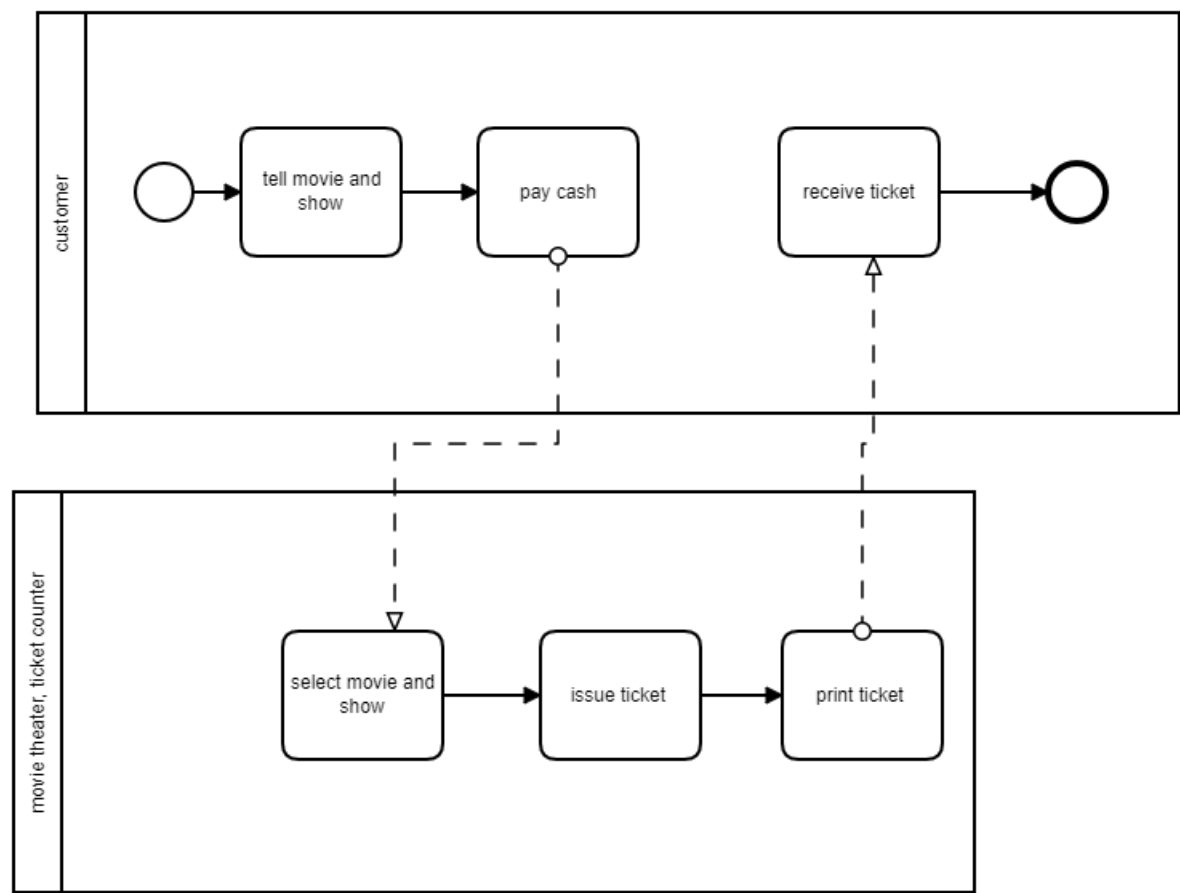
Others

Modify ticket

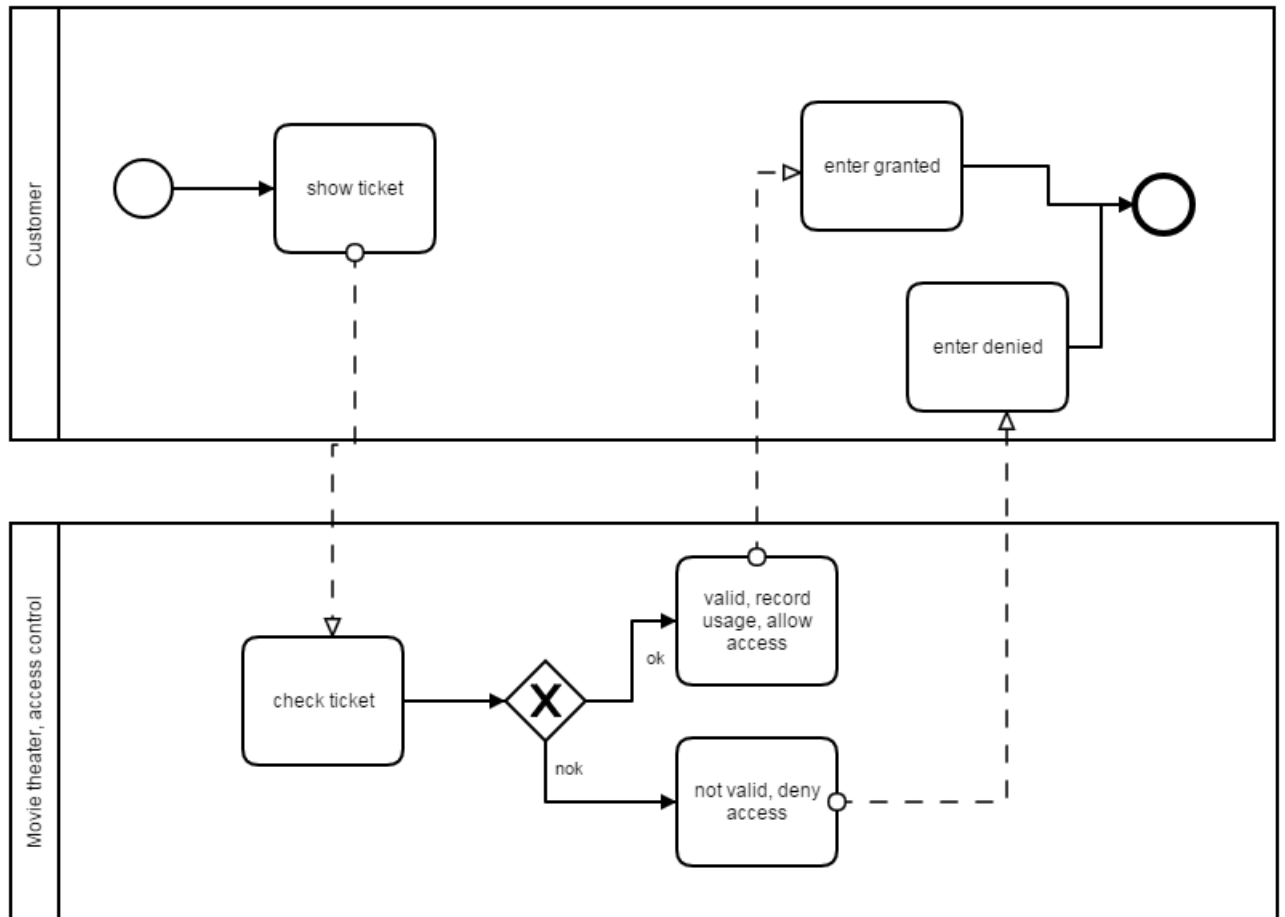
Purchase ticket, online



Purchase ticket, paper at counter



Access control



4 Define the KPIs, considering these high level business goals (or CSF), CSF1 increase customer satisfaction, CSF2 minimize cost of the ticket management process. In the table below show the correspondence CSF – KPI

CSF name	KPI Category (General, cost ..)	KPI Name	KPI Description	Unit of measure
	general	N_T	Number of tickets sold per year	
	General	N_E	Number of employees in theater	
CSF1	service	LT_P	Lead time to purchase ticket by a customer	Min
CSF1	service	LT_E	Lead time to enter show room (includes ticket check)	Min
CSF2	Efficiency	UC_S	Unit cost to sell one ticket	Euro
CSF2	efficiency	UC_C	Unit cost to control one access	euro
		C_T	Cost of one paper ticket (paper, ink)	euro
CSF2	quality	Q	#fraudulent accesses per year / N_T	%

5 Compare the previous and the current situation, using the KPIs defined above

KPI	AS IS	TO BE
N_T		Could increase slightly
N_E		Employee for access control could be possibly avoided
LT_P		Should decrease, no lines online
LT_E		Should decrease, but strongly depends also on physical space and capability of customers to handle qr code scanner
UC_S	(Cost of personnel at sale counter per year + cost of ticket*N_T)/ N_T	<p>(Cost of personnel at sale counter per year + k *C_T*N_T + (TCO/5)) / N_T</p> <p>(for TCO see point 6,7 – assumption to use 5 years depreciation)</p> <p>(0 &lt;= k &lt;= 1 is the percentage of paper tickets sold)</p> <p>It decreases if cost of sales personnel can be reduced, and if k reduces possibly to zero</p>
UC_C	Cost of personnel at access control per year / N_T	<p>(Cost of personnel at access control per year + (TCO/5)) / N_T</p> <p>(for TCO see point 6,7 – assumption to use 5 years depreciation)</p> <p>It decreases only if cost of personnel at access control can be reduced, otherwise increases</p>
Q		Should be reduced

Define the TCO for the movie theater to shift to the TO BE situation

Phase	Cost
Construction C	Purchase of new IT infrastructure (web portal, QR scanners)
Deployment D	Deployment of functions of IT portal, QR scanner install, training of employees
Operation maintenance OM	QR scanner operation and maintenance, web application operation and maintenance (for one year)
Dismissal DS	Uninstall web app, Data porting to new future IT infrastructure

$$TCO = C + D + 5OM$$

$$TCO_{\text{per year}} = TCO/5 \text{ (assuming 5 years depreciation period and 10 years usage)}$$

- 6 Considering a 5 years period, define costs and savings (ROI analysis) by adopting the TO BE situation

Year/ cost or saving	Year 1	Year2	Year3	Year4	Year5
Cost	C+D				
Cost	OM	OM	OM	OM	OM
Saving	Reduction of personnel?	Reduction of personnel?	Reduction of personnel?	Reduction of personnel?	Reduction of personnel?
	ST	ST	ST	ST	ST

Assumption: operations start in year 1, the application is a standard one available from the market  
Savings come from the reduced number of printed tickets – savings on personnel are possible only if personnel is reduced

$$\text{Saving on ticket} = ST = (1-k) \cdot N_T \cdot C_T \text{ where all terms depend on the year}$$

- 8 Considering the KPIs and the ROI, is the TO BE situation better? (answer Yes or No): Yes

Why?

Unit cost decreases only if personnel is reduced, and that is hardly possible if both paper and digital tickets must be maintained in parallel. However for the customer the service level increases significantly (no more lines). (It has to be noted that no lines depends not only on the new IS, but on the overall design of the theater, especially for a smooth access control).

Further, fraudulent tickets should be greatly reduced. And finally, digital tickets allow gathering data on customers, that can be used to increase customer care and sales.

Overall the TO BE has many advantages over the AS IS.

9 Consider the process of point 1. The movie theater company has decided to use a web service from another company to support the ticketing process (and other processes). Frame this in terms of outsourcing axes.

Location: off site

Object: application, service

Unicity: shared

10 Considering the Business Model Canvas approach, describe briefly the long tail business model, and provide an example of it.

See slides

11 'Decision cost': explain the concept and how IT influences it.

See slides

12 A BPMN model can be enacted. Explain what this means and how it works

The model (ex BPMN + java add ons) is automatically translated into an executable process. It requires a process engine that receives the process and executes it. It is the same approach used for interpreted languages.

The traditional approach involves writing manually one or more programs (ex in Java or C# or else) that support a process. In this case the process model is not available. Or if available the transition to programs is manual.