# Efficient Parking Management Model

## Optimal Parking Slot Assigment to Reduce Traffic Congestion

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Introduction:

Parking has become an increasingly challenging aspect of urban life, leading to frustration, traffic congestion, and environmental concerns. As cities continue to grow, the search for parking spaces has become a significant source of wasted time and resources. To address these pressing issues, the proposed parking slot assignment model uses advanced data structures such as linked lists and priority queues as well as data-driven algorithms to optimize the parking experience for individuals and prevent the wastage of time.

Literature Survey:

1)Urbanization and Parking Challenges:

The global phenomenon of urbanization has resulted in more people living in cities than ever before. While this urban shift brings numerous benefits, it has also given rise to the substantial problem of parking. As more individuals flock to cities, vehicular traffic escalates, and the quest for parking spots intensifies. This phenomenon, in turn, contributes to traffic congestion, air pollution, and a significant loss of time and resources. It is thus crucial to find innovative solutions to alleviate the burden of parking-related issues in our urban landscapes.

2)Existing Parking Solutions:

Over the years, several parking management systems have been introduced in an attempt to mitigate these mounting challenges. Traditional parking systems often rely on manual monitoring, with little to no automation in place, leading to suboptimal utilization of parking slots. Recent innovations include smart parking systems that utilize sensors to detect available spaces, for example the ones present in malls and residential aprtments and these guide drivers to them. Although these systems represent a step forward in parking management, they often lack personalized features and may not efficiently optimize parking assignments based on individual user needs.

3)User-Centric Parking Models:

A promising avenue of research in parking management revolves around user-centric models. These models prioritize the individual preferences and requirements of users, including factors such as preferred parking duration and vehicle type. Nevertheless, many of these models still rely heavily on pre-booked parking slots rather than providing real-time allocation based on actual usage.

Problem Definition of the Proposed Model:

The primary challenge that our proposed parking slot assignment model seeks to address is the prevailing inefficiency in parking space utilization. This inefficiency arises from the lack of real-time allocation of parking slots based on the user’s preferences, leading to a lot of inconveniences, including wasted time, increased traffic congestion, and decreased productivity. This model strives to improve the parking experience by fixing these commonly occuring issues:

1)User-Centric Approach:

This model mainly focuses on the inputs and preferences of the user. By accepting user input, which includes information such as the desired payment type, vehicle type, and any special requirements, the model will provide the suitable parking slot and facilties requested by the user. There user will no longer have to waste time searching for a specific type of a parking which will be facilitated by this model.

2)Real-Time Allocation:

The capability of this model centers around its ability to maintain a real-time database of parking slot availability. It achieves this by utilizing advanced data structures, such as priority queues and linked lists. This extensive database guarantees the efficient allocation of parking slots in real-time, considering factors like proximity, vehicle size, and the immediate availability of parking slots. Users will no longer need to deal with outdated information or make futile trips to occupied parking spots.

3)Usage-Based Billing:

The model also introduces a billing system that calculates parking fees based on the total duration a user has utilized a parking space. This transition from pre-booking of the parking slots to usage-based billing ensures that individuals are charged fairly and accurately, and also addresses the major issue of users overstaying their pre-selected time duration and causing confusion and disruption in the slots assignment system. This makes the parking process more flexible and user-friendly for users.

Conclusion:

In sum, The proposed parking slot assignment model aims to change the parking experience for users in urban environments for the better and make it better accessible too. By addressing the core problems of inefficiency in parking space utilization and providing a user-centric, real-time solution, the model will improve the overall parking experience, reduce traffic congestion, and contribute to a more sustainable and efficient urban environment. This model aims to reduse the time wasted in searcng for parking slots which in turn will reduce the traffic congestion in the general area.