

White Paper



Delivering an Optimal User Experience across Multiple Mobile Devices

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Businesses are continuously looking at faster and more cost effective ways to deliver services to customers. Services delivery is shifting from the physical world to the Internet. The mobile device is fast catching up as a new and ubiquitous channel of delivery of a variety of content. It offers a much wider reach and anywhere and anytime interaction when compared to the Internet world or physical world.

Businesses are looking to rapidly move their applications to mobile users, and the biggest barrier to the successful adaptation of the mobile channel has been delivering an optimal user experience across multiple mobile devices.



Consumers are no longer passive in today's connected world. Their demand for information has increased and many expectations on easy to use mobile applications are prevalent including:

- Shorter transaction times
- Faster navigation
- Dynamic and personalized services
- An appealing, easy to navigate user interface

However, many challenges need to be addressed to capitalize on these opportunities:

1	Device diversity	Different screen sizes, keyboard capabilities, memory size, processing capability etc.
2	Browser diversity	Different markup languages, levels of scripting support etc.
3	Platform diversity	J2ME, BREW, Symbian etc.
4.	Network diversity	GPRS, CDMA, UMTS, HSPDA etc
5	Security	WTLS, SSL and TLS

1. Least common denominator approach

This approach aims at defining the solution for a range of handsets / devices with the lowest level of capabilities. Since the solution works with a range of minimum capability devices it also works on mid and high end devices, but with a much poorer user experience than which they can support. This solution does not harness the capabilities provided by the underlying platform.

2. Best fit approach

The best fit manual approach solves some of these mentioned ubiquitous challenges by grouping the handset platforms into different categories based on their capabilities and developing individual solutions for each category of devices. The biggest problems here are the time to deploy, added developmental costs and added issues of maintainability. The best fit automatic approach, which in other sense can be referred to as device aware approach solves some ubiquitous challenges by automating the rendering process based on the identification of underlying platform. Even though it addresses some issues and offers customization based on the underlying platform, it still lacks the awareness required to harness the advantages provided by the context to take the user experience to the next level. This approach works at the content layer and hence any device specific optimization is done at a very generic level with the primary intent of fitting the content better for a mobile device. Effective mobile transactions are not about fitting Internet content onto a mobile device. It provides very transactions oriented view to the end user. Moreover, these solutions address device level customization but not user level personalization and fail to meet consumer expectations. Hence, the least common denominator approach and best fit approach solutions failed to effectively address the user experience. Generic content repurposing is not the answer.

3. Context aware approach

This approach solves the challenges of the ubiquitous mobility in a best way by automating the rendering process based on the context. Context includes but is not limited to device, browser, usage pattern, usage preference, location, time and network etc. This approach is centered around defining what transactions the end user wishes to access using the mobile phone and identifying and enabling these transactions on the user's mobile device in the best context-sensitive way. Note, that this is about what user wants to do and not about showing content designed for the desktop based internet application on the mobile device. Consider an example of a movie ticketing application on a mobile device.

The usual transaction process is as follows:

- User logs in
- User select the city
- User select the specific location within the city
- User selects the day and time
- User selects the movie
- User pays for the ticket



In case of least common denominator (Figure 1a) and best fit approach (Figure 1b), the user has to complete all the steps every time to successfully book the ticket. In best fit approach, which involves device specific optimization functionalities like Ajax, Java scripts etc., and as well as different look and feel can be enabled based on the mobile handset type. In case of least common denominator such customizations are not possible and the same experience is provided irrespective of the mobile handset capability.

Considering the same movie ticketing applications as in the earlier example, the context aware approach helps to reduce the transaction time to 50% by providing the personalized movie list based when the user logs in (Figure 2).

- User logs in
- User selects the movie and theatre location (personalized movie list is thrown based on context on the location, usage pattern, user preference, date and time)
- User pays for the ticket

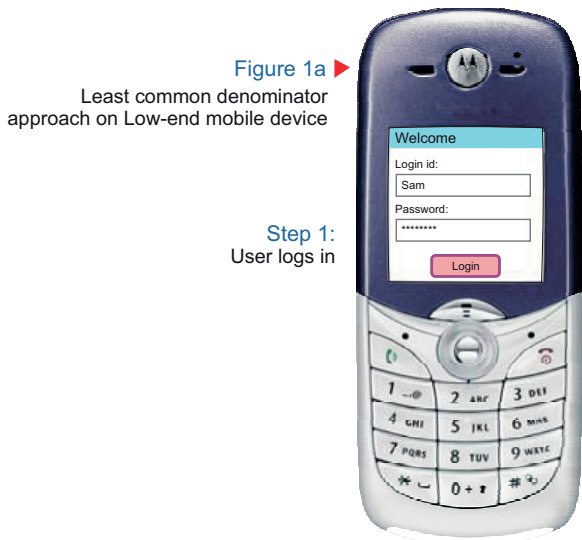
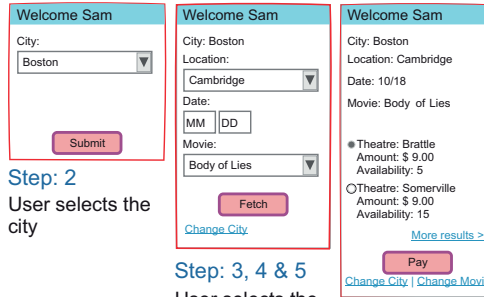


Figure 1a

Least common denominator approach on Low-end mobile device

Step 1:
User logs in

In least common denominator approach, same experience is provided (figure 1a), irrespective of the handset



Step: 2
User selects the city

Step: 3, 4 & 5
User selects the specific location within the city, date and movie

Step: 6
User pays for the ticket

Note: Page to be scrolled

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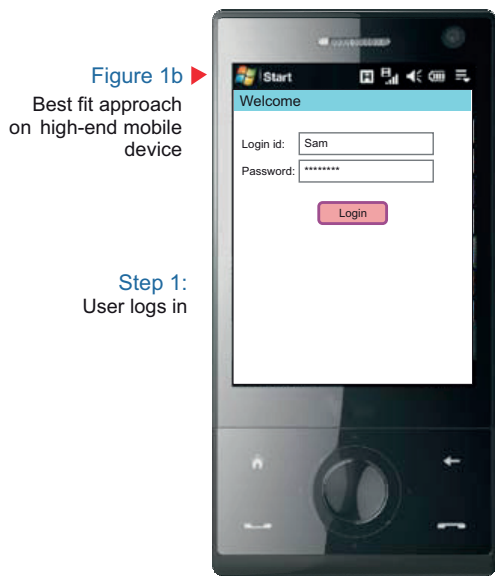
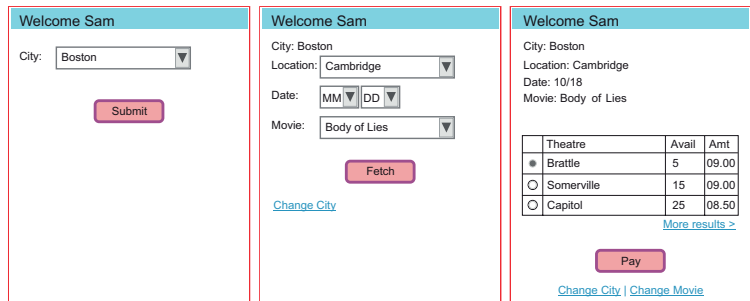


Figure 1b

Best fit approach on high-end mobile device

Step 1:
User logs in

In best fit approach, low-end handset experience is available as in figure 1a. And for high-end handset the experience as in figure 1b is available.



Step: 2
User selects the city

Step: 3, 4 & 5
User selects the specific location within the city, date and movie

Step: 6
User pays for the ticket

Note: Some of the browser capabilities are leveraged

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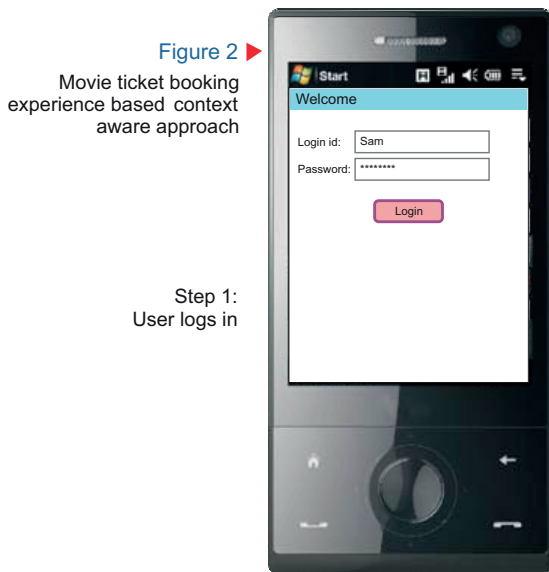
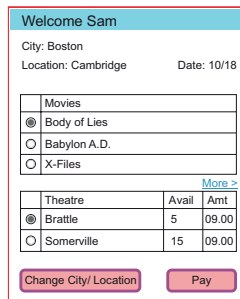


Figure 2

Movie ticket booking experience based context aware approach

Step 1:
User logs in



Step: 6

User pays for the ticket

Note: The context aware approach enhances the experience provided in best fit approach by reducing the transaction time to 50% and also by providing the personalized listing based on previous transactions.

Context aware approach not only reduces the transactions flow but also reduces the data flow and saves the cost considering the fact the mobile data are at premium. Also the user is able to complete the transactions much faster enhancing user experience. This context aware approach is about personalization of the user experience for the user's context, like taking into account the time of the day, location and preferences etc. Some of the optimization and flexibility of usability/ user interface design in context aware approach are discussed below.

1. Tracking and rendering customized pages based on usage pattern:

Example a: A product category list page shows list of product category in different order for different users based on his/ her frequently accessed category.

Example b: The shipping address is remembered so for the next time while placing the order the shipping address is prefilled automatically.

Example c: By remembering and showing the navigation flow the, navigation to and from different services is made very easy.

2. Customization based on the network bandwidth:

Example a: Product Images is rendered with high/ medium/ low resolutions or no product images based on the network.

Example b: Video demos of product are enabled based on the type of the network (i.e. 3G)

3. Customization based on device (also possible in best fit/ LCD approach):

Example a: Pagination based on the screen real estate of device. So if the product search, results in more data they are shown in multiple pages.

Example b: Rendering of date fields/ optional fields in a page based on the keyboard type. This avoids multiple key strokes.

4. Customization based on browser (also possible in best fit/ LCD approach):

Example a: Pagination based on the cache size of the device

Example b: Support for on device validations thru java scripts

Example c: Support for rendering different kind of markup languages like xHTML, cHTML etc.,

Example d: Leveraging AJAX on the supported devices and performing the server side validations and implementing pagination etc. Pre-fetching during search operations provides a seamless experience.

5. Customization based on location:

Example a: Search result customization based on the location of the user like showing the closest ATM first.

Example b: Support for location based and application context based ads

Example c: Support for map navigation

6. Customization based on time:

Example a: Search result of an Event customized based on the event timings.

Example b: Day and Time based advertisements.

7. Customization based on user profile:

Example a: Services are enabled/ disabled based on the user profile.

Example b: Advertisements based on profile of the user and his/ her interest.

8. Customization based on channel and the client (thin/ thick):

Example a: Services are enabled/ disabled based on the channel like showing different set of services for HTTP based requests and different set of services for HTTPS based requests.

Example b: An option to store product details/ transaction history on your handset based in case of J2ME client.

Infosys solution to optimize mobile user experience

Infosys mConnect is a context aware enterprise middleware platform that addresses these user experience challenges. It offers unique personalized user experience based on the context of each transaction for the individual user. It offers multi-mode support like SMS, thin client (mobile browser), thick client (J2ME application). The solution is being evolved into convergence gateway to provide additional supports like desktop PC and IPTV. Through this extended support, Infosys mConnect would be able to support mobile devices, desktop PC and IPTV specific interfaces with one time integration, thereby reducing cost, time to deploy and enable rich user experience based on the context aware approach.



Conclusion

Mobile channel is different from a desktop world. It is anywhere, anytime and personalized channel. Mere adaptation of desktop applications to mobile devices impacts negative user experience due to diverse device types, limited screen size, keyboard capabilities and cost of data exchange. Mobile users need faster, shorter and secure transactions. The key to the successful adaptation of mobile channel is by personalized user experience that is best catered through context aware approach, unlike best fit approach where the experience is customized for the device rather than the user.

About the Authors

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Puneet Gupta heads the mobility platforms and solutions initiative at Infosys. He and his team focus on building next generation middleware that allow organizations to focus on leveraging the mobile channel without being bogged down with the technology and infrastructural complexities.

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Venkat Kumar S has been key in conceptualizing and developing products and intellectual properties in mobility space for Infosys. Experienced in wireless space around radio access network, OA&M and value added services, Venkat plays an instrumental role in Infosys' R&D arm.

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Karthik GV is part of team conceptualizing and designing Infosys mobility solution, Infosys mConnect. His expertise lies in the area of 'Mobile Web Technologies' and, has filed four patents and has several publications to his credit.



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