NÚCLEO DE APOIO À PESQUISA EM SOFTWARE LIVRE

Workshop do Núcleo de Apoio à Pesquisa em Software Livre

São Carlos, 16 a 17 de Outubro de 2014.

AWMo

Accessible Web Modeler

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ICMC USP SÃO CARLOS

IME-USP

EACH USP

Departamento de Computação

INSTITUTO DE INFORMÁTICA UFG

AWMo

- Filipe Del Nero Grillo
- Apoio: CNPq
- Mestrado no ICMC USP

Modelos

Modelos

Requisitos

Engenheiro de software

Código fonte

Linguagem de máquina

MDD

Requisitos

Engenheiro de software

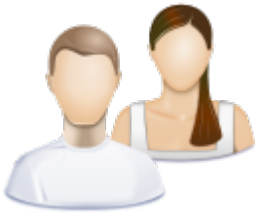
Modelos

Código fonte

Linguagem de máquina

O problema

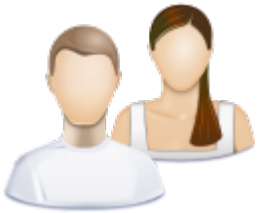
Engenheiro de software



Modelo

O problema

Engenheiro de software

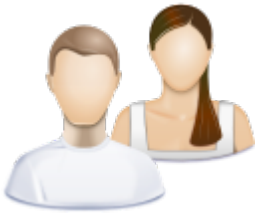


Modelo

Engenheiro de software deficiente visual

O problema

Engenheiro de software



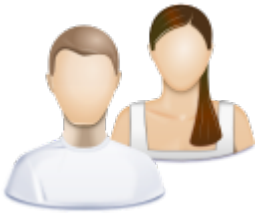
Modelo

Engenheiro de software deficiente visual

Leitor de tela

O problema

Engenheiro de software

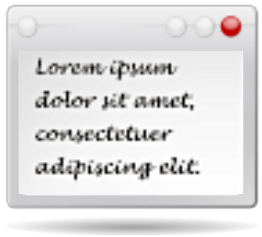


Visão gráfica

Engenheiro de software deficiente visual

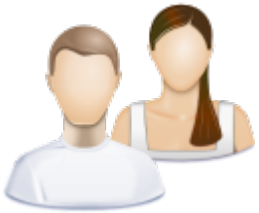
Leitor de tela

Visão textual



A proposta

Engenheiro de software



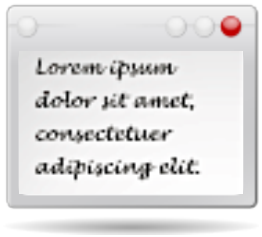
Visão gráfica

Modelo

Engenheiro de software deficiente visual

Leitor de tela

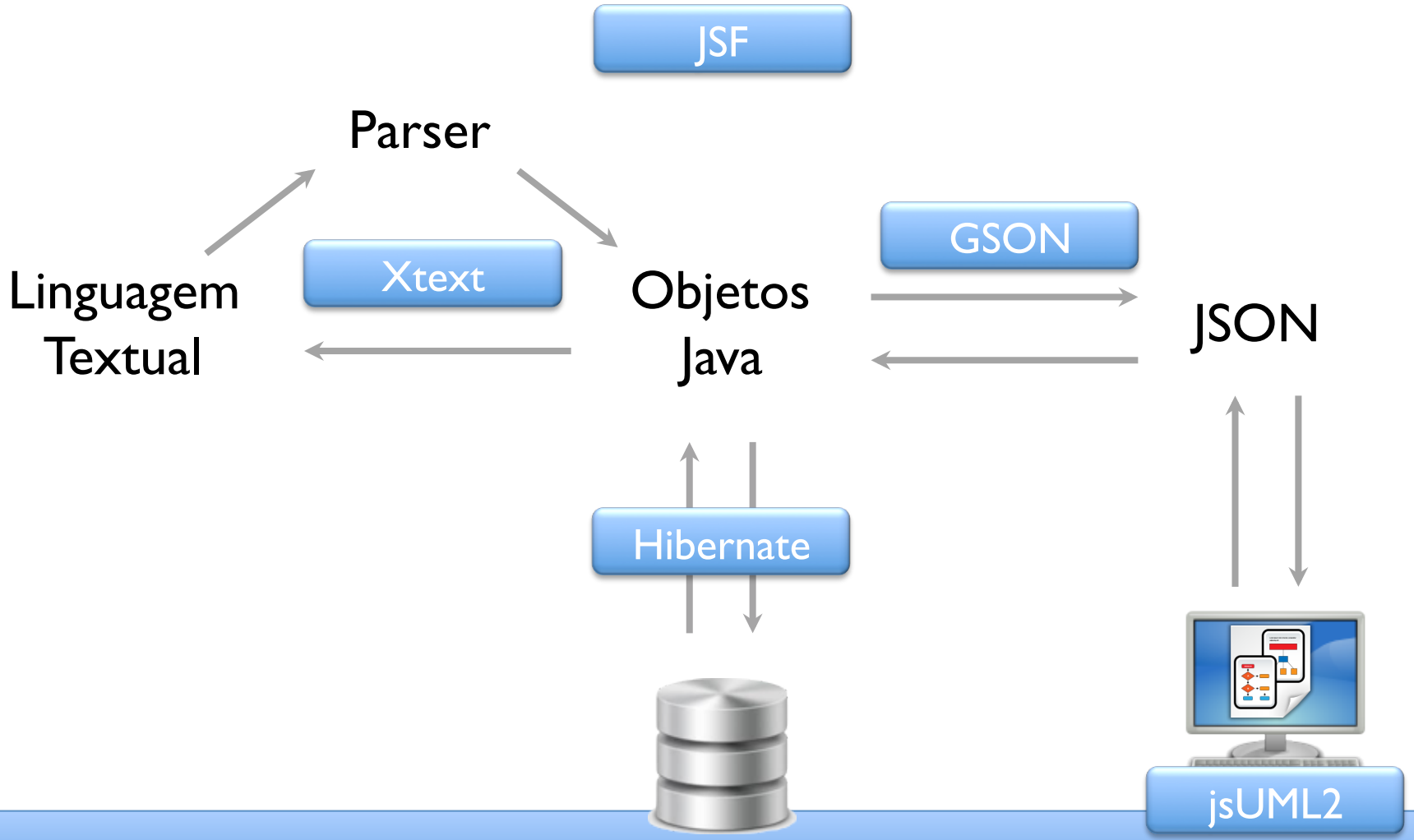
Visão textual



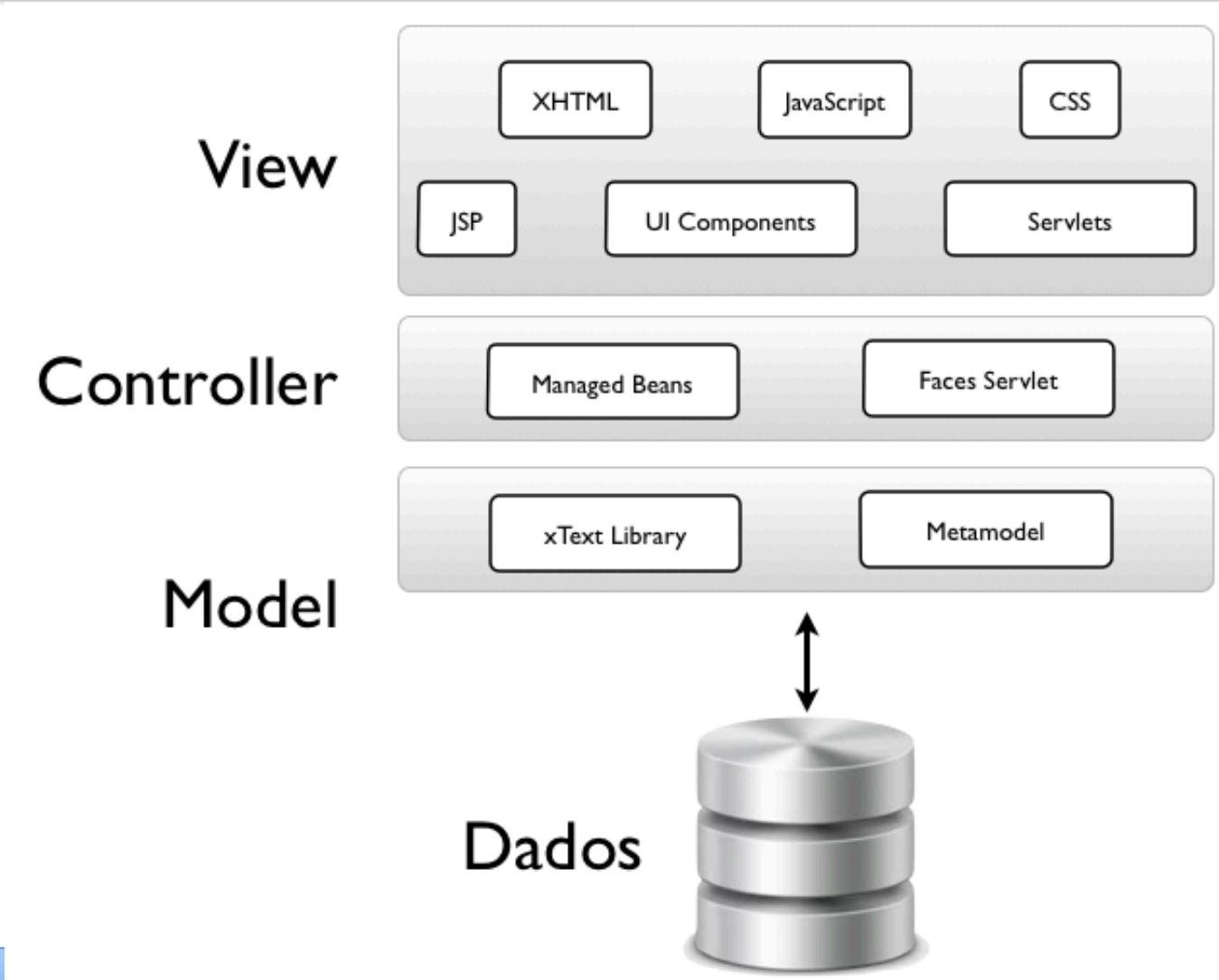
Trabalhos relacionados

- GEMSJax: Implementação Web da ferramenta GEMS (*Generic Eclipse Modeling System*) (Farwick et al., 2010)
- SLIM (*Synchronous Lightweight Modeling*): Ambiente Web para modelagem colaborativa síncrona. (Thum et al., 2009)
- Diagramas para deficientes visuais por meio de hierarquias (Metatla et al., 2007) e interfaces de áudio (Metatla et al., 2008).
- Visualização e navegação em UML por meio de *joystick* e leitores de tela. (King et al., 2004)

Tecnologias empregadas



Tecnologias empregadas



Demonstração

http://garapa.intermidia.icmc.usp.br:3000/awmo

Case Study protocol

- Research questions
  - Does the AWMo tool enable access to **visualization** and **edition** of UML class diagram by visually impaired users?
  - Does the AWMo textual language present itself as a barrier, any kind of problem, that prevents the use of the approach proposed by AWMo?
  - What is the biggest challenge faced by visually impaired users on accessing and constructing **visual models**?

- Subject selection
  - Visually impaired AND
  - Work with software development or studying computer programming related course.

Study protocol

- Data collection
  - Pre-use interview (a first degree data collection, in a direct contact with the subjects)
  - Observation (a second degree data collection, where we had collected data indirectly – using MORAE - TechSmith)
    - While the subject completed a pre established set of **5 tasks** , the following information were recorded:
    - Computer screen and the program that were running during the process
    - Interaction of the user with the input devices
    - Webcam showing the face of the user during the process
    - Audio was captured
  - Post-use interview (semi-structured)

Study protocol

- Metrics
  - **Faults** per task - the number of actions performed by the user that, if not corrected, might result in an error
  - **Errors** per task – the number of errors that AWMo tool displayed to the user (a problem on the textual grammar interpretation)
  - **Time** per task - the amount of time that the subject took to complete each task
  - **Doubts** per task – the number of questions asked by the subject during the task

Execução do estudo

- Arthur (abril/13)
  - Homem, 31 anos. É cego desde os 15 anos
  - Estudante de Sistemas de Informação
  - 7 anos de uso de computadores, 5 anos com programação.
- Ford (outubro/13)
  - Homem, 35 anos. É cego a 5 anos
  - Formado em processamento de dados. Profissional em uma Instituição Financeira
  - 26 anos de uso de computadores e experiência com programação

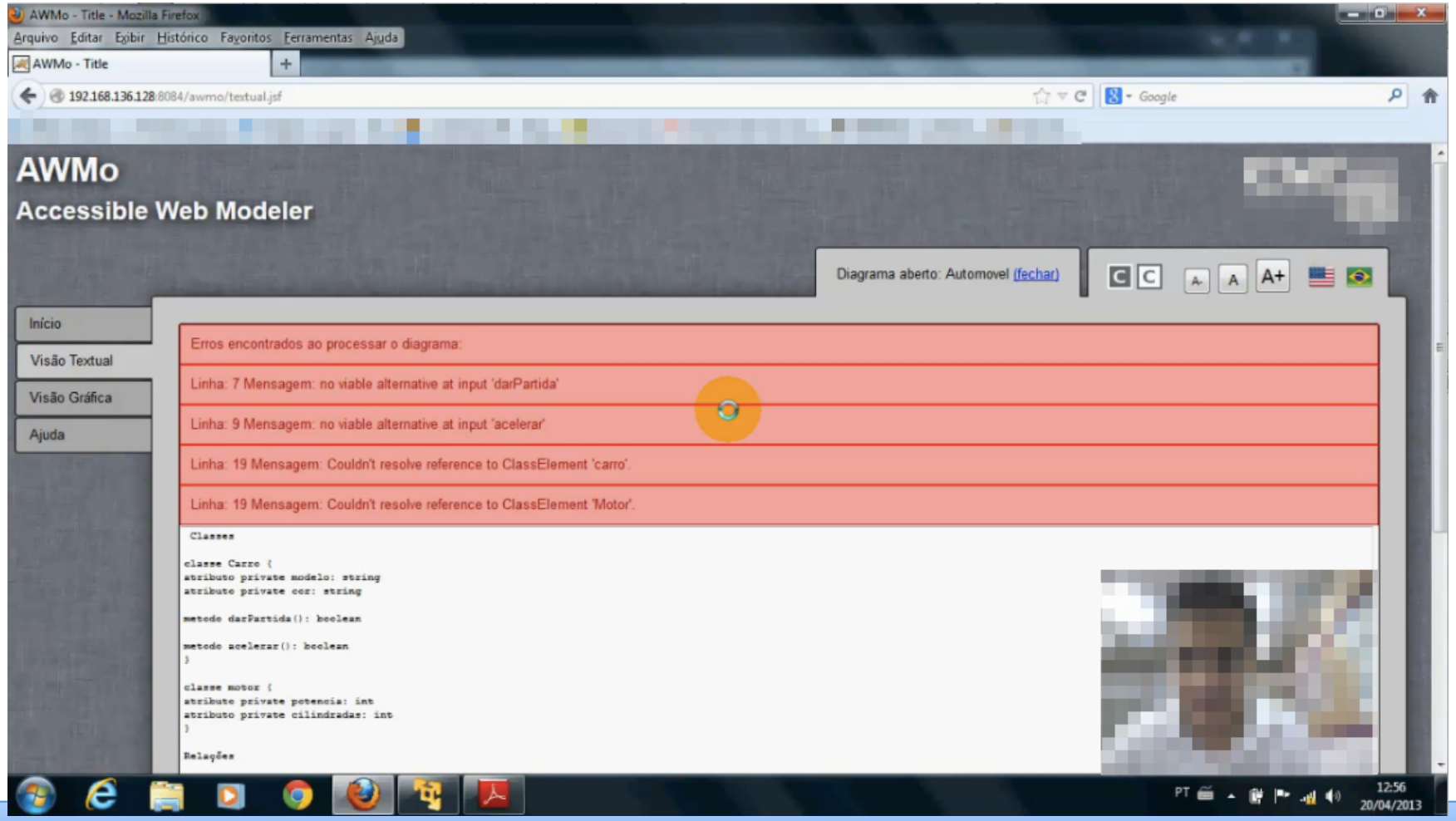
Results

- Arthur's testimony (his main concerns in the pre-use interview):

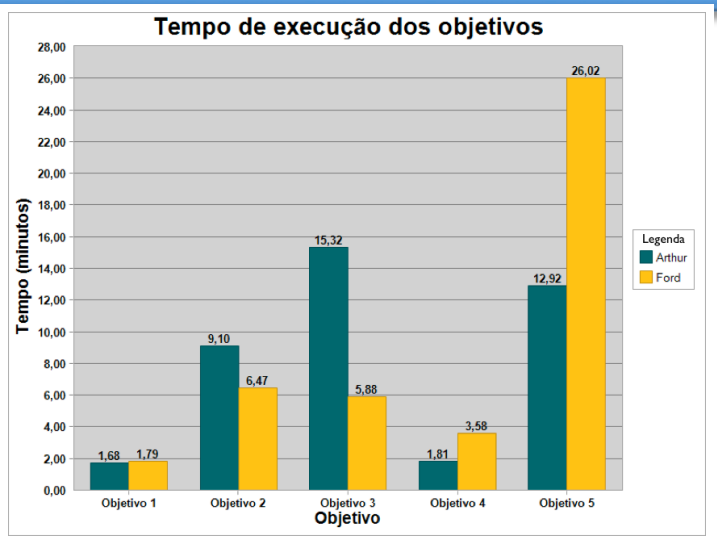
"At first, the lack of practicality. Because if you are in a real situation where you're in a project and you need to work with sighted peers, for instance, you need someone to "read" the diagrams to you, that itself is a waste of time in certain aspects. Besides, you cannot communicate with the others through the diagram, for instance, for someone that is used to see the graphical representation, reading a textual description will not give him a clear understanding, this is one aspect. There is also the matter of reading, because I need someone to describe them to me. I can't get a diagram made by someone else and understand it independently."

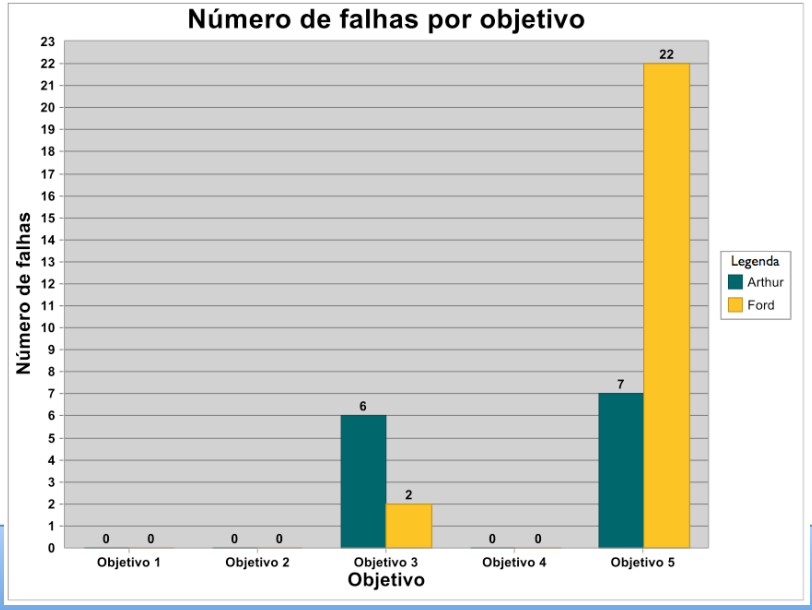
- Observation phase: 51 minutes of video recorded.

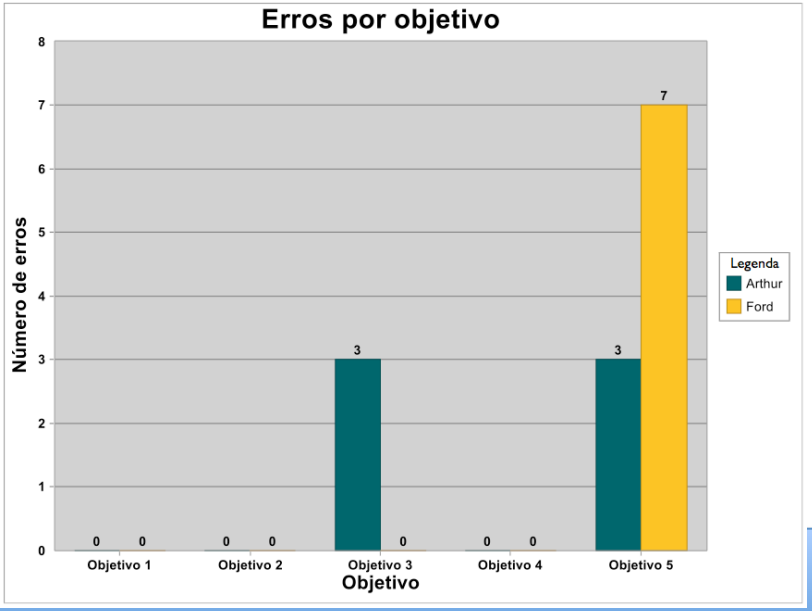
Results


AWMo - Title - Mozilla Firefox
Arquivo Editar Exibir Histórico Favoritos Ferramentas Ajuda
AWMo - Title
192.168.136.128:8084/awmo/textual.jsf
AWMo
Accessible Web Modeler
Diagrama aberto: Automovel (fechar)
Início
Visão Textual
Visão Gráfica
Ajuda
Erros encontrados ao processar o diagrama:
Linha: 7 Mensagem: no viable alternative at input 'darPartida'
Linha: 9 Mensagem: no viable alternative at input 'acelerar'
Linha: 19 Mensagem: Couldn't resolve reference to ClassElement 'carro'.
Linha: 19 Mensagem: Couldn't resolve reference to ClassElement 'Motor'.
Classes
classe Carro {
atributo private modelo: string
atributo private cor: string
metodo darPartida(): boolean
metodo acelerar(): boolean
}
classe motor {
atributo private potencia: int
atributo private cilindradas: int
}
Relações
12:56
20/04/2013

Results


Tempo de execução dos objetivos
Tempo (minutos)
28,00
26,00
24,00
22,00
20,00
18,00
16,00
14,00
12,00
10,00
8,00
6,00
4,00
2,00
0,00
1,68
1,79
9,10
6,47
15,32
5,88
1,81
3,58
12,92
26,02
Objetivo 1
Objetivo 2
Objetivo 3
Objetivo 4
Objetivo 5
Objetivo
Legenda
Arthur
Ford


Número de falhas por objetivo
Número de falhas
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
0
0
0
6
2
0
0
7
22
Objetivo 1
Objetivo 2
Objetivo 3
Objetivo 4
Objetivo 5
Objetivo
Legenda
Arthur
Ford


Erros por objetivo
Número de erros
8
7
6
5
4
3
2
1
0
0
0
0
0
3
0
0
0
3
7
Objetivo 1
Objetivo 2
Objetivo 3
Objetivo 4
Objetivo 5
Objetivo
Legenda
Arthur
Ford

Results

- Arthur's testimony (his main concerns in the post-use interview):

"I did think AWMo was easy to work with. I found the interface simple accessible and intuitive. I only pointed one problem about the top menu buttons that do not prevent its use. Apart form that, the rest is totally accessible and easy to use, even the feedback on the language syntax errors are simple to find on the page"

" I believe it would be, for instance, if I found myself in a software engineering team that uses UML massively and the other developers were willing to learn the textual language, that is a simple and fast thing. I think it would be really interesting….. I found the project cool to use and collaborate with"

Conclusões

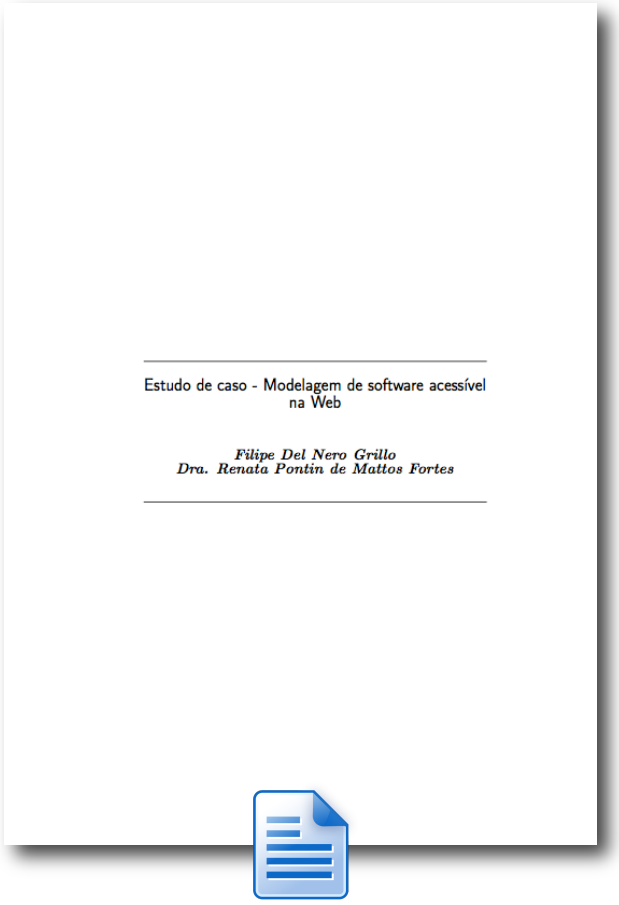
- ✓ Durante os estudos de caso realizados a abordagem da AWMo mostrou que permite o acesso e a edição de diagramas de classe da UML para deficientes visuais;
- ✓ A linguagem textual não se mostrou como uma barreira que impedisse ou atrapalhasse o uso;
- ✓ Há indícios de que a abordagem possa ser utilizada em ambientes profissionais, no dia-a-dia.

Contribuições

Ferramenta

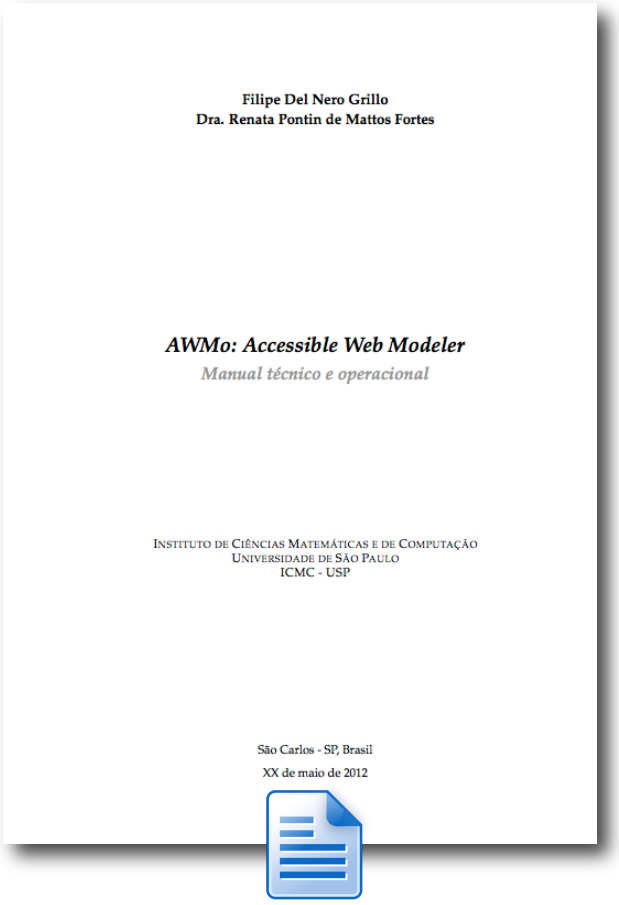
Código fonte disponível em: https://github.com/awmo/awmo

Contribuições


Estudo de caso - Modelagem de software acessível na Web

Filipe Del Nero Grillo
Dra. Renata Pontin de Mattos Fortes

Notas do ICMC-USP
Série Computação – Nº 96


Filipe Del Nero Grillo
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AWMo: Accessible Web Modeler
Manual técnico e operacional

INSTITUTO DE CIÊNCIAS MATEMÁTICAS E DE COMPUTAÇÃO
UNIVERSIDADE DE SÃO PAULO
ICMC - USP

São Carlos - SP, Brasil
XX de maio de 2012

Relatórios Técnicos do ICMC-USP
Nº 397

Todos@Web 2013

2º Lugar – Aplicativos e Tecnologias assistivas

Trabalhos futuros

- Finalizar desenvolvimento da visão gráfica;
- Executar o estudo de caso com mais usuários;
- Adicionar nova visão com hiperlinks para possibilitar a leitura não sequencial.
- Evoluir Código fonte: https://github.com/awmo/awmo

Obrigada.

Perguntas?

Filipe Del Nero Grillo grillo at icmc.usp.br
Dra. Renata Pontin de Mattos Fortes renata at icmc.usp.br

Publicações

- Grillo, F. D. N.; Fortes, R. P. M.; Lucrédio, D. Towards collaboration between sighted and visually impaired developers in the context of model-driven engineering. In: Workshop GMLD (on Graphical Modeling Language Development). Joint Proceedings, 8th European Conference on Modelling Foundations and Applications (ECMFA 2012), Copenhagen: Technical University of Denmark - DTU Informatics, 2012, p. 241–251.
- Fortes, R. P. M.; Dias, A. L.; Grillo, F. D. N.; Masiero, P. C. Creating a project towards universal access: is it possible? In: Proceedings of INTERACT 2013 Workshop on Rethinking Universal Accessibility: A broader approach considering the digital gap, Cape Town (South Africa): INTERACT 2013 Workshop on Rethinking Universal Accessibility: A broader approach considering the digital gap, 2013
- Grillo, F. D. N.; Fortes, R. P. M. AWMo: Accessible Web Modeler. In: WebMedia '13: XII Workshop on Tools and Applications (WFA), 19th Brazilian Symposium on Multimedia and the Web, 2013.
- Grillo, F. D. N.; Fortes, R. P. M. Accessible modeling on the web: A case study. Procedia Computer Science, v. 27, n. 0, p. 460 – 470, 5th International Conference on Software Development and Technologies for Enhancing Accessibility and Fighting Info-exclusion, {DSAI} 2013, 2014. Disponível em http://www.sciencedirect.com/science/article/pii/ S1877050914000520
- Grillo, F. D. N.; Fortes, R. P. M. Tests with blind programmers using AWMo: an accessible web modeling tool. Paper accepted for publishing on 16th International Conference on Human-Computer Interaction - HCII 2014.

Referências bibliográficas

- Farwick, M.; Agreiter, B.; White, J.; Forster, S.; Lanzanasto, N.; Breu, R. A web-based collaborative metamodeling environment with secure remote model access. In: Proceedings of the 10th international conference on Web engineering, ICWE'10, Berlin, Heidelberg: Springer-Verlag, 2010, p. 278-291 (ICWE'10).
- King, A.; Blenkhorn, P.; Crombie, D.; Dijkstra, S.; Evans, G.; Wood, J. Presenting UML Software Engineering Diagrams to Blind People. In: Miesenberger, K.; Klaus, J.; Zagler, W.; Burger, D., eds. Computers Helping People with Special Needs, v. 3118 de Lecture Notes in Computer Science, Springer Berlin / Heidelberg, p. 626-626, 2004.
- Metatla, O.; Bryan-Kinns, N.; Stockman, T. Using hierarchies to support non-visual access to relational diagrams. In: Proceedings of the 21st British HCI Group Annual Conference on People and Computers: HCI...but not as we know it - Volume 1, BCS-HCI '07, Swinton, UK, UK: British Computer Society, 2007, p. 215-225 (BCS-HCI'07).
- Metatla, O.; Bryan-Kinns, N.; Stockman, T. Comparing interaction strategies for constructing diagrams in an audio-only interface. In: Proceedings of the 22nd British HCI Group Annual Conference on People and Computers: Culture, Creativity, Interaction - Volume 2, BCS-HCI '08, Swinton, UK, UK: British Computer Society, 2008, p. 65-69 (BCS-HCI '08).
- Thum, C.; Schwind, M.; Schader, M. SLIM - A Lightweight Environment for Synchronous Collaborative Modeling. In: Proceedings of the 12th International Conference on Model Driven Engineering Languages and Systems, MODELS '09, Berlin, Heidelberg:Springer-Verlag, 2009, p. 137-151 (MODELS '09).