VIETNAM NATIONAL UNIVERSITY, HANOI
VNU UNIVERSITY OF ENGINEERING AND TECHNOLOGY
------🕮------

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom – Happiness
****

INFORMATION ON DOCTORAL THESIS

1. Full name: Lê Hồng Anh 2. Sex: Male

3. Date of birth: 17/10/1980 4. Place of birth: Vĩnh Phúc

5. Admission decision number: 3205/QĐ-ĐT Dated: 08/11/2010

6. Changes in academic process:

Changed thesis title to "Methods for modeling and verifying event-driven systems", decision number 34/QĐ-ĐT, signed date: 18/01/2013

7. Official thesis title: Methods for modeling and verifying event-driven systems.

8. Major: Software Engineering 9. Code: 62.48.01.03

10. Supervisors:

Assoc. Prof. Trương Ninh Thuận, Assoc Prof. Phạm Bảo Sơn

11. Summary of the **new findings** of the thesis:

1. This thesis introduces a new method to model and verify a database system with triggers by using Event-B. This approach provides detailed steps to translate database concepts to Event-B notations. The translation is based on the similarity between triggers, which has the form of ECA rules, and Event-B events. The method reduces cost of development because it can detect errors at early design phase and it is easy to apply in practice. A tool partly supports for transforming a database systems with triggers is also developed.

2. The thesis continues investigating the benefit of similar acts between ECA rules and Event-B event to propose a method to model and verify context-aware systems. Furthermore, the thesis recognizes the advantages of Event-B refinement mechanism to make proposed methods suitable for incremental modeling. Significant properties are defined as invariants and can be checked automatically using the supporting tool Rodin.

3. We handle the case that a system is described by imprecise requirements. Its behavior rules are now specified in the form of Fuzzy If-Then rules. The thesis introduce a new representation of fuzzy terms by classical sets and present a set of rules to translate Fuzzy If-Then rules to Event-B constructs. We

also make an extension by introducing timed Fuzzy If-Then rules to model a timed system.

4. The thesis makes use of Event-B refinement and some existing reasoning methods to analyse some significant properties of imprecise system requirements such as safety and eventuality properties.

12. Practical applicability, if any:

The result of the thesis can be used in real software development process, especially for event-driven systems.

13. Further research directions, if any:

The future work of the thesis is developing new methods based on Event-B for modeling and verifying time-constraint properties. New supporting tools are also developed for automatical modeling.

14. Thesis-related publications:

1) Hong Anh Le and Ninh Thuan Truong. Modeling and Verifying WS-CDL Using Event- B. In Proc. ICCASA 2012. LNICST Vol 109, pp. 290-299, Springer, 2013.

2) Hong Anh Le and Ninh Thuan Truong: Modeling and Verifying DML Triggers Using Event-B, In Proc. ACIIDS 2013. LNCS Vol 7083, Vol 2, pp. 539-548, Spinger, 2013.

3) Hong Anh Le, Loan Dinh Thi and Ninh Thuan Truong: Modeling and Verifying Imprecise Requirements of Systems Using Event-B. In Proc. KSE 2013. AISC Vol 244, pp. 313-325, Springer, 2013.

4) Hong Anh Le and Ninh Thuan Truong: Formal Modeling and Verification of Context-Aware Systems Using Event-B. In Proc. ICCASA 2013. LNICST Vol 128, pp. 250-259, Springer 2014 (The best paper award).

5) Hong Anh Le and Ninh Thuan Truong: Formal Modeling and Verification of Context-Aware Systems Using Event-B. In EAI Endorsed Transactions on Context-Aware Systems and Applications, Vol 2, e4, 2014. ISSN 2409-0026.

6) Hong Anh Le, Ninh Thuan Truong and Shin Nakajima: Verifying Eventuality Properties of Imprecise System Requirements. The 30th ACM/SIGAPP Symposium On Applied Computing - Software Engineering Track, April 13–17, 2015. Salamanca, Spain.

Date: 13/04/2015
Signature of supervisors

Date: 13/04/2015.
Signature of PhD student