Since the two papers are written in English, I choose to finish my work in English to convey a more precise message.

Summary of “Computational Thinking and Thinking about Computing”

This paper can be split into two main parts, “computational thinking” and thinking about computing”. In the first part, the author discusses about the definition and component of computational thinking, as well as it’ s application and the issue of computational thinking education. In the second part, the author puts emphasis on the three drivers on computing, which is scientific questions, technological innovation and societal demands.

In part one, two core concepts of computational thinking are revealed. The essence of computational thinking is abstraction, and computing is the automation of our abstractions. The completely abstraction process includes defining abstractions, working with multiple layers of abstraction and understanding the relationships among the different layers. As the metal tools of computing, abstractions’ power can be amplify by computing, which is the automation of abstractions. Due to our precise and exacting notations and models, computer is able to interpret our abstractions and processes them, releasing tremendous energy. The author gives some examples to strengthen this idea. Through the applications of computational thinking in statistics, image identifying, economics and so on, we can peek it' s infinite power from the combination of abstractions and automation, which is envisioned to be instrumental to new discovery and innovation in all fields in the future. Then the author talk about education issue of computational thinking, raising questions about the elemental concepts of computational thinking, the effective teaching way as students' learning ability growing as well as integration of teaching the tools with teaching the concepts.

In part two, three drivers of computational thinking, science, technology, society, are mentioned sequentially. As the prediction of Moore' s law coming to an end becomes true, silicon-based technology is reaching it' s limit. Nanocomputing, biocomputing and even quantum computing are in great demand. In terms of device, data, communication and far-reaching technological machines, people are aspired to take advantages of technology drivers to promote computing. Since users are quite diverse, ranging from young to old, rich to poor, individuals to companies, computing is driven forward by these societal drivers. What' more, in aspect of science, the scientific challenges of the "five questions in computing" is meant to be a starting point.

Summary of “The Great Principles of Computing”

This paper discusses about computing’ s history as a discipline, computing’ paradigm, seven principles of computing, information possesses and where computing stands. The most important part of this paper is definitely the seven principles.

When talking about computing’ s history, the author sorts out the history from the 1930s to 1990, revealing this discipline’ forming, starting, growing possess, as well as the name of this field’ changes. Through understanding this history, we can perceive how computer science has evolved from a simple computational tool to an independent discipline.

After talking over the history, the paradigm of computing is detailly discussed. At first it was believed that computing was a branch of applied mathematics, electrical engineering or computational-oriented science. However, today there is an agreement that neither science and engineering characterize computing, with a catchphrase saying: “Computing is the study of information processes, natural and artificial.

With computing’ history and it’ s paradigm introduced, the author is able to mention his core idea, the great principles of computing. The author and his colleagues have developed the principles into seven categories: computation, communication, coordination, recollection, automation, evaluation and design. Then he explains the dynamics of interactions between computing and other fields, which includes implementation and influence, since these principles are relatively static.

Now the definition about computing is kind of complete, it’ s high time discussed information which has no settled definition. The science of Information is defined on the observable affects without having a precise definition of meaning. According to the author, an information process is a sequence of representations. A computation is an information process in which the transitions from one element of the sequence to the next are controlled by a representation.

In the end, the author restates that the great-principles framework reveals a rich set of rules on which all computation is based. These principles interact with the domains of the physical, life and social sciences, as well as with computing technology itself, which proves that computing is not a subset of other sciences.

Question 2:

In my opinion, to fully understand why the core of computational thinking is construction, it’ s essential to figure it out that what is construction. I will answer question 2 through the explanation of word “construction” through the example of designing a smart home system. Construction is the first step of solving a problem with computational thinking, including decomposition and connection.

Through decomposition, a large initial issue can be split into several small aspects, which is easier to deal with. The smart home project can be divided into several small projects such as sensors, controllers, actuators, and a user interface. This process actually helps us find out what are the specific abstractions we need to define to work out the problem effectively. Each small aspect of the initial problem is beneficial for us to decide what details we need to highlight and what details we can ignore, finally we successfully establish several layers based on our abstractions, dividing the original huge task.

After decomposition, we need to build the connections between those separated but internally related problems which have been defined, settling the original issue. It’ s time to design the interfaces between those different layers established before. After these tasks are completed under the agreed upon protocol, the machine can automatically execute commands and achieve automation. To be specific, the smart home project needs four main interfaces, which are sensor-controller Interface, controller-actuator Interface, user Interface-controller Interface, actuator-environment Interface. Sensor-controller Interface sends data collected from sensors to controllers, so the controllers can make decisions and commands. Those decisions and commands go through the controller-actuator Interface to actuators, then actuators execute commands. The execution of commands usually influences environment information and features. These changes can be detected and sent to actuator-environment Interface, achieving further adjustment. Since it’ s necessary to build an interface that allow people to communicate with the system, user Interface-controller Interface is established. With all of the work above done, an automation system is realized too, which means a fully automated system able to running without people’ s demands comes true.

Through the explanation above, a big issue (smart home) is constructed first, then abstracted and automated, finally realized. This process is based on the construction process which provides basic definition and motivation for abstraction and automaton, so we can say that the core of computational thinking is construction, and abstraction and automation are tasks of construction.

Question 3:

My github username is “Buendia2088” and I have uploaded a project called “BinaryTree-in-CPP”.