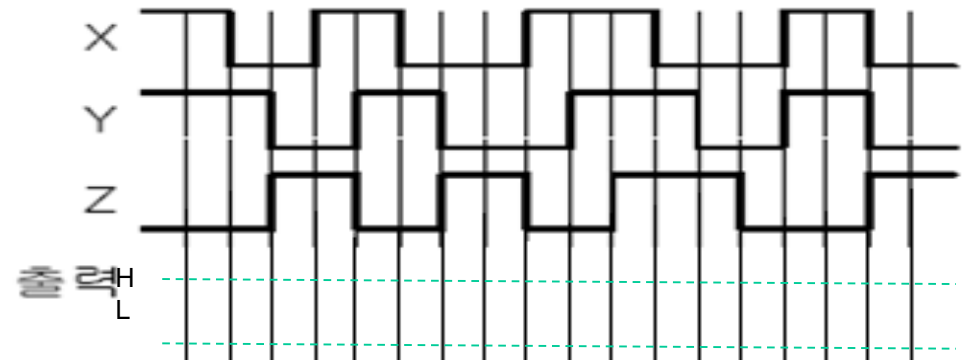
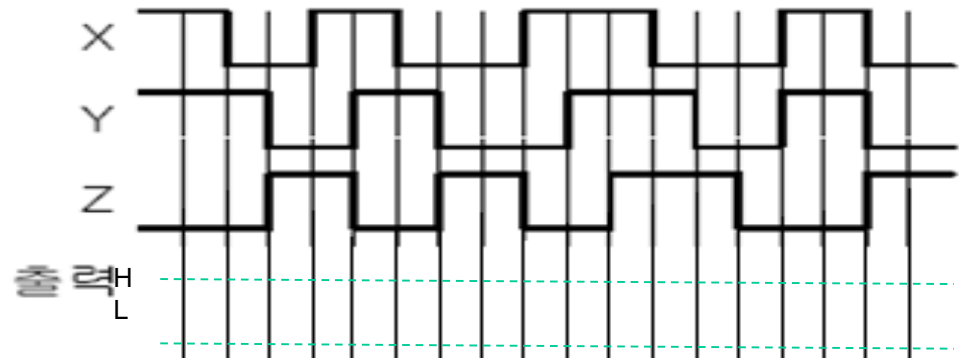


## [실습] Chapter 1.5~1.6 :: 연습문제

1. [기본게이트] **3입력 NAND** 게이트의 심벌, 부울식, 진리표, 출력파형을 작성하시오. (관련연습문제 p49 - 71, 72)



2. [기본게이트] **3입력 XOR** 게이트의 심벌, 부울식, 진리표, 출력파형을 작성하시오. (관련연습문제 p49 - 71, 72)



## [실습] Chapter 1.5~1.6 :: 연습문제

3. 여러 개의 스위치를 가진 회로에서 어느 한 스위치만 닫았더니, 램프가 켜졌다. 이것은 어떤 유형의 스위치 회로인가?

4. 여러 개의 스위치를 가진 회로에서 한 개 이외의 모든 스위치들을 닫았으나 램프는 켜지지 않았다. 이것은 어떤 유형의 스위치 회로인가?

# [실습] Chapter 1.5~1.6 :: 연습문제

## 5. DDCA2e\_Ch1\_0에서1까지\_ex : p49 연습문제 73 진리표 작성:

**문제 1.73** 다수결 게이트(majority gate)는 입력의 과반수 이상이 TRUE일 때만 출력이 TRUE가 된다. 그림 1.41에 보인 다수결 게이트의 진리표를 완성하라.



그림 1.41 3-입력 다수결 게이트

## 6. DDCA2e\_Ch1\_0에서1까지\_ex : p49 연습문제 75 진리표 와 논리식 작성:

**문제 1.75** 그림 1.43에 보인 3-입력 OR-AND-INVERT(AOI) 게이트는 C가 TRUE이고 A 또는 B가 TRUE일 때 출력이 FALSE가 된다. 이외의 다른 경우는 TRUE를 출력한다. 이 게이트에 대한 진리표를 완성하라.



그림 1.43 3-입력 OR-AND INVERT 게이트

## [실습] 응용문제

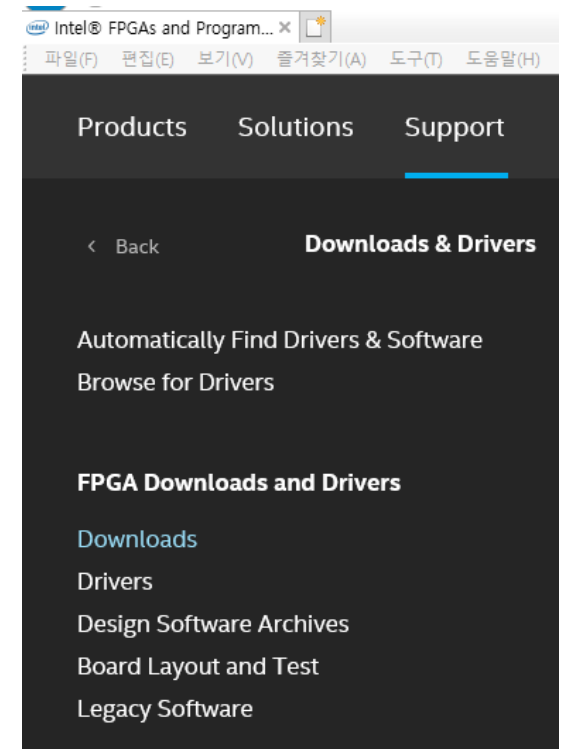
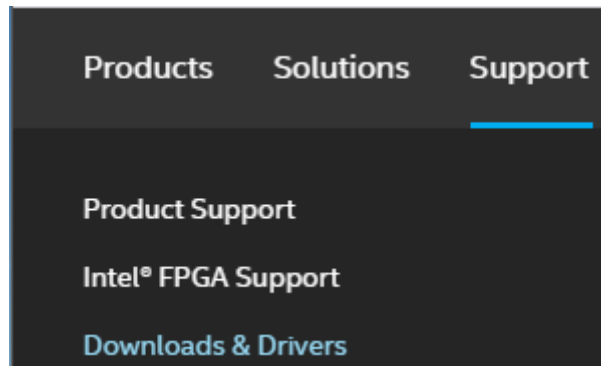
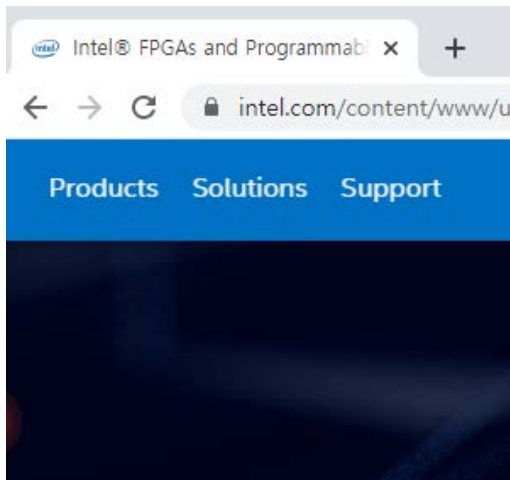
7. [응용문제] 어떤 의사결정 회의에서 각 위원들은 안건에 대한 의견을 표명하기 위한 스위치를 한 개씩 가지고 있다. 각 위원은 안건에 찬성하면 스위치를 누르고, 반대한다면 스위치를 누르지 않는다. 두 위원(A,B)의 의견이 같은 경우에 한해 C 위원의 찬성이 있을 경우 출력(F)을 '1'로 발생하는 회로를 구성하시오. 스위치는 누르면 '1'을 발생하고, 누르지 않으면 '0'을 발생한다.

8. 위 [응용문제]를 다음페이지에서 설명하는 쿼터스를 이용하여 구현하고 시뮬레이션 결과가 예상한 진리표와 일치하는지 확인하시오.

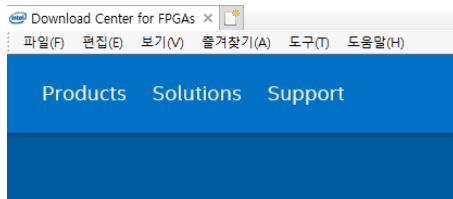
# [실습] Altera Quartus 설치

## 0. Altera Quartus 다운로드 설치

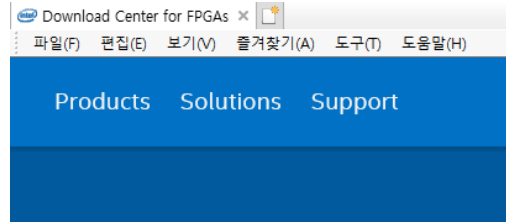
- <http://www.altera.com>
- support – download – Quartus II Web Edition



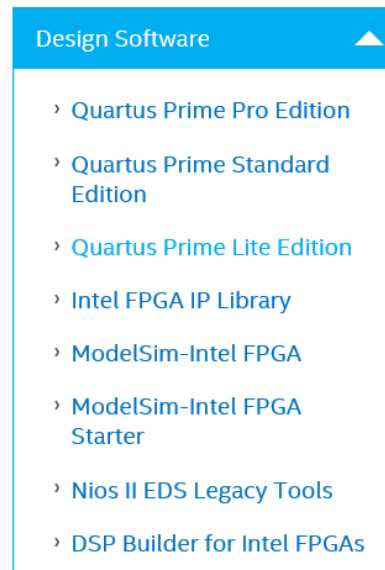
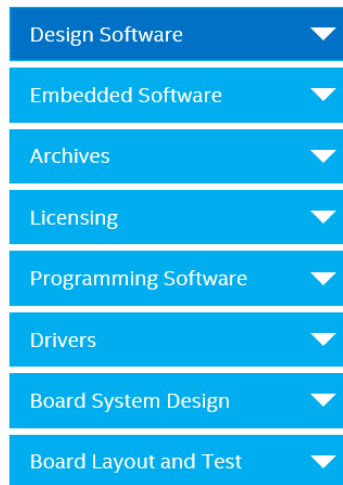
# [실습] Altera Quartus 설치



Download Center for



Download Center for



# [실습] Altera Quartus 설치

**Quartus**

Release date: S  
Latest Release:

Select edition:  
Select release:

**Operating System**

- ✓ The Quartus II software will no longer be available after 6/26/2020. This version is the latest functional and security updates and will not be supported. All versions are provided as-is. We recommend that users of this version uninstall and discontinue use as soon as possible to the [latest available software version](#) for their device and follow the [technical recommendations](#) to improve security.
- ✓ The Quartus II software will no longer be available after 6/26/2020. This version is the latest functional and security updates and will not be supported. All versions are provided as-is. We recommend that users of this version uninstall and discontinue use as soon as possible to the [latest available software version](#) for their device and follow the [technical recommendations](#) to improve security.
- ✓ To use the Quartus II software, you must install the device support files. You do not have to install all the device support files. You can install only the device support files that you need.
- ✓ OS Support
- ✓ The Quartus II software will no longer be available after 6/26/2020. This version is the latest functional and security updates and will not be supported. All versions are provided as-is. We recommend that users of this version uninstall and discontinue use as soon as possible to the [latest available software version](#) for their device and follow the [technical recommendations](#) to improve security.

19.1  
18.1  
18.0  
17.1  
17.0  
16.1  
16.0  
15.1  
15.0  
14.1  
14.0  
13.1  
13.0sp1  
13.0  
12.1 SP 1  
12.1  
12.0 SP 2  
12.0 SP 1  
12.0  
11.1 SP 2  
11.1 SP 1  
11.1  
11.0 SP 1  
10.1 SP 1  
10.1  
10.0  
9.1 SP 2  
9.1 SP 1  
9.1  
9.0 SP 2

Select a previous version of Quartus II:

This version of Quartus II software will no longer be available after 6/26/2020. This version is the latest functional and security updates and will not be supported. All versions are provided as-is. We recommend that users of this version uninstall and discontinue use as soon as possible to the [latest available software version](#) for their device and follow the [technical recommendations](#) to improve security.

Individual Files

DVD .iso File

## Download Option 1: Individual Files

Download large, standalone installation files to manually install complete software and device support. Note: If you download and install only the Quartus® II software, subsequently you must also download and install the device support. You do not have to install all the device support files. You can install only the device support files that you need.

Quartus II Web Edition	Platform	File Name	Size
Quartus II Web Edition	Windows	<a href="#">91_quartus_free.exe</a>	1.4 GB

# [실습] Altera Quartus 설치

Intel® FPGA Program

## Sign In

 [Intel Employee? Sign in here](#)

Intel Customer or Partner?

[By signing in, you agree to our Terms of Service](#)

☐ Remember me

[Sign In](#)

## Register

If you don't already have access to the Intel® FPGA Program, select the option that best meets your needs.

 [Register now for an individual account](#)

If you do business with Intel as an individual, you can request for basic access to Intel® FPGA Program tools and resources.



# [실습] Altera Quartus 설치

## Register for Intel® FPGA Program

Join the Intel® FPGA Program to get immediate access to online tools, technical content, and other resources. If you do business with Intel **as an individual**, you can request for basic access to Intel® FPGA Program tools and resources.

If you wish to register for a company account and be eligible for Intel® Premier Support, please [register for a premier account](#).

### Personal Information

<input type="text"/>	Last Name
Business Email Address	Username
Password	Confirm Password
Country/Region ▼	
Job Function ▼	

### Personal Information

First Name hallym	Last Name hallym
Business Email Address yanges@hallym.ac.kr	Username yanges@hallym.ac.kr
<input checked="" type="checkbox"/> Use my email as username	
Password ●●●●●●●●	Confirm Password ●●●●●●●●
<ul style="list-style-type: none"><li>✓ Must include a letter</li><li>✓ Must include a number</li><li>✓ Must include a special character</li><li>✓ Must be between 8 and 15 characters in length</li></ul>	
Country/Region South Korea	
Job Function Education and Training	
Country/Region Code +82 ▼	Phone 332482326
Extension (option)	

# [실습] Altera Quartus 설치

## Personal Information

[Edit](#)

## Enrollment Questions

Project Timeframe

12-24 Months



Industry

Computer Systems Design and Consultir

Preferred Distributor

Asia - Arrow Asia Pac

## Company Information

Company Name

hallym

Number of Employees

25-49

Country/Region

South Korea



State/Province

Gang'Weondo

City

Chuncheon-si

Zip/Postal Code

24252

## Communication Subscriptions

Subscribe to email updates from Intel (optional).

☐

Programmable Logic Product Announcements

☐

Programmable Logic Newsletters

Next Step

## Personal Information

[Edit](#)

## Enrollment Questions

[Edit](#)

## Terms and Conditions

By submitting this form, you are confirming you are an adult 18 years or older and you agree to share your personal information with Intel to stay connected to the latest Intel technologies and industry trends by email and telephone. You can unsubscribe at any time. Intel's web sites and communications are subject to our [Privacy Notice](#) and [Terms of Use](#).

Submit

# [실습] Altera Quartus 설치

## Thank you for registering for the Intel® FPGA Program

If this is the first time you are creating an Intel account, a verification email has been sent to you. Please check your inbox and follow the link to complete your registration. The link sent will expire in 45 days.

Didn't receive the verification email for Intel® FPGA Program? Check your spam folder or click on re-send email below.

[Resend email](#)

Email sent successfully



[< Sign In](#)

## Verify Your Email Address

Thank you for verifying your email address. You will be redirected to the site in a few seconds.

[Sign In FAQ](#)

받는사람

yanges@hallym.ac.kr <yanges@hallym.ac.kr>

주소추가

메모

## Welcome: Verify your e-mail

### Action Required

Welcome - Thank you for your interest in the [Intel® FPGA Program](#).  
You now have access to the [Intel® FPGA Program](#) online tools, technical resources, and more.

Please retain this e-mail for future reference.

**Login ID:** yanges@hallym.ac.kr

**E-mail Address:** yanges@hallym.ac.kr

### What you need to do

Please verify your e-mail address by clicking this [link](#) or by copying the link into your browser.

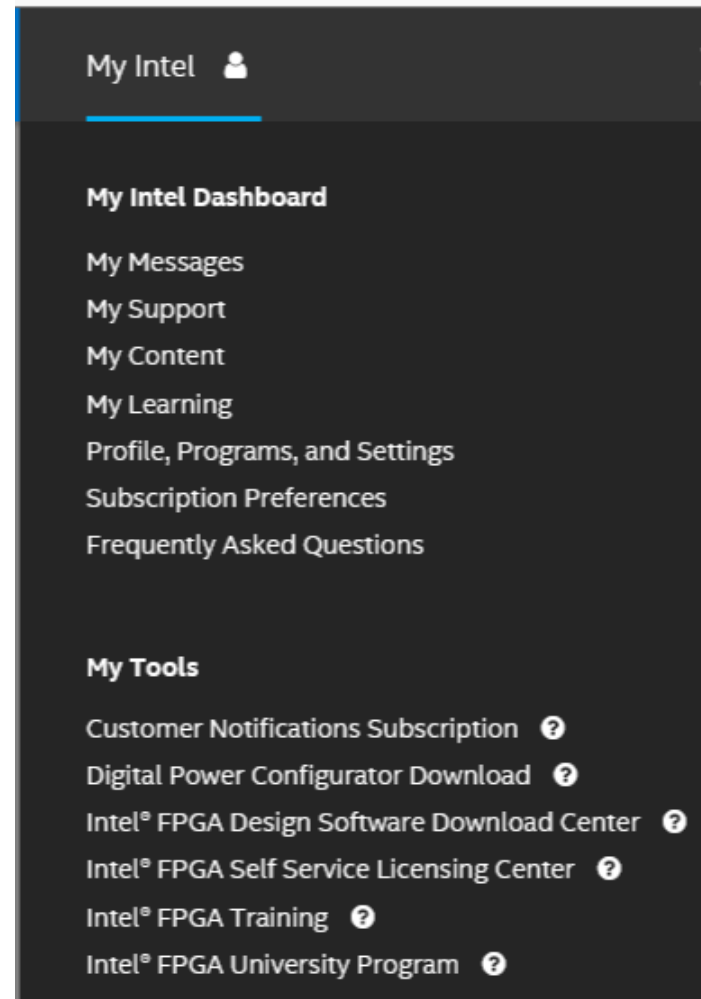
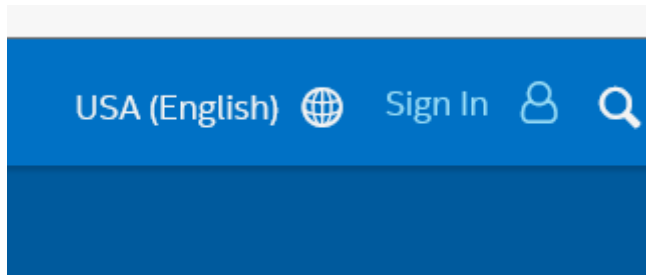
Your password should be protected as confidential. Your use of the Intel® websites are governed by Intel's Terms and Conditions of Use, located at the bottom of each respective site's web pages.

If you have any questions, please contact us [here](#).

Visit this [link](#) any time to manage your profile.

Please DO NOT reply to this e-mail message. This is an automated message. To ensure that you continue receiving our e-mails, please add us to your address book.

# [실습] Altera Quartus 설치



# [실습] Altera Quartus 설치

## Download Center for FPGAs

- Design Software ▼
- Embedded Software ▼
- Archives ▼
- Licensing ▼
- Programming Software ▼
- Drivers ▼
- Board System Design ▼
- Board Layout and Test ▼

## Software Selector

Select by Version [Select](#)

**Quartus Software**

- ▶ + Version 10.1
- ▶ + Version 10.0
- ▶ + **Version 9.1**
- ▶ + Version 9.0
- ▶ + Version 8.1
- ▶ + Version 8.0
- ▶ + Version 7.2
- ▶ + Version 7.1
- ▶ + Version 7.0

## Software Selector

Select by Version [Select by Device](#) [Select by Software](#)

**Quartus Software**

- ▶ + Version 10.1
- ▶ + Version 10.0
- ▶ - **Version 9.1**
  - 9.1, Service Pack
  - 9.1, Service Pack
  - 9.1**
- ▶ + Version 9.0
- ▶ + Version 8.1

Quartus Edition	Supported Devices
Subscription Edition	<b>Stratix</b> (IV,III,II GX,II,GX,I) <b>Arria</b> (GX) <b>Cyclone</b> (III,II,I) <b>MAX</b> (II) <b>HardCopy</b> (II)
Web Edition	Device information currently unavailable

# [실습] Altera Quartus 설치

Individual Files

DVD .iso File

## Download Option 1: Individual Files

Download large, standalone installation files to manually install complete software and device support. Note: If you download and install only the Quartus® II software, subsequently you must also download and install the device support . You do not have to install all the device support files. You can install only the device support files that you need.

Quartus II Web Edition	Platform	File Name	Size
Quartus II Web Edition	Windows	<a href="#">91_quartus_free.exe</a>	1.4 GB
Quartus II Web Edition	Linux	<a href="#">91_quartus_free_linux.tar</a>	1.7 GB

# [실습] Altera Quartus 설치

\* Thank you for downloading

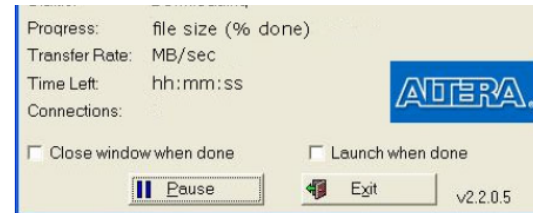
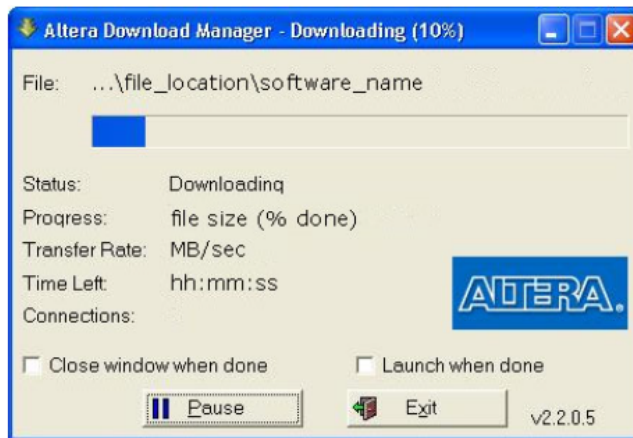
Quartus II Web Edition Software Version

## Next Steps

- › [Get licenses](#)
- › [Get licensing and installation support](#)

If the Altera Download Manager window, as shown in figure 1, troubleshooting steps below.

**Figure 1. Altera download window**



## Download Troubleshooting Steps

1. Disable your pop-up blocker
  - › If a yellow pop-up blocker bar appears just below your Internet Explorer menu bar (see Figure 2), click the yellow bar and select "Temporarily Allow Pop-ups." Any third-party pop-up blockers are disabled to download a file.

**Figure 2. Windows Explorer Pop-Up Blocker**



- › You may also by-pass the pop-up blocker by following this link: [Download your file now](#).

2. The Altera Download Manager, as shown in figure 1, will appear. Click "Run" to initiate the download.

[My Intel Account Help](#)

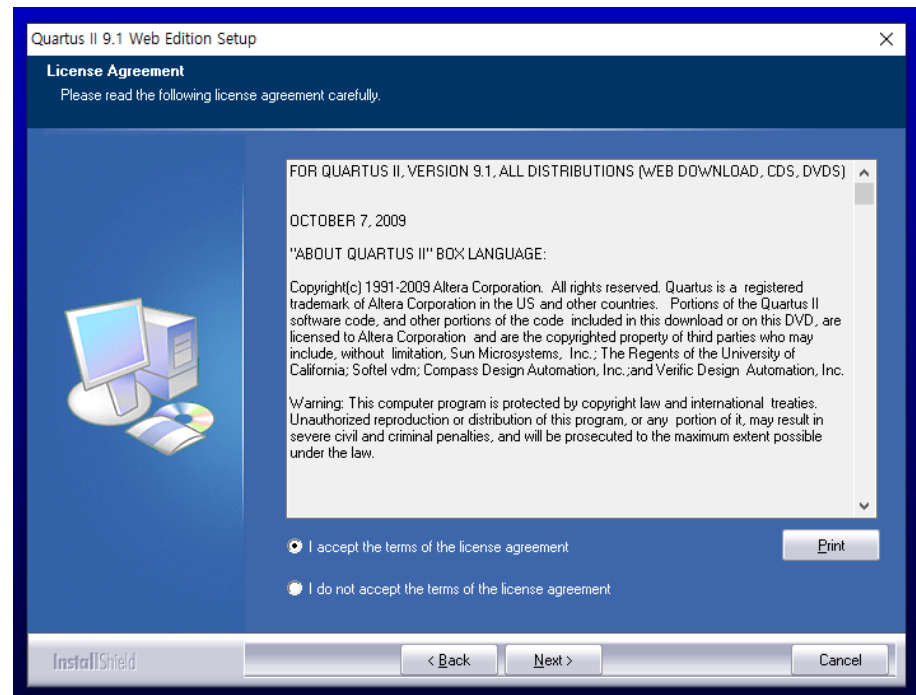
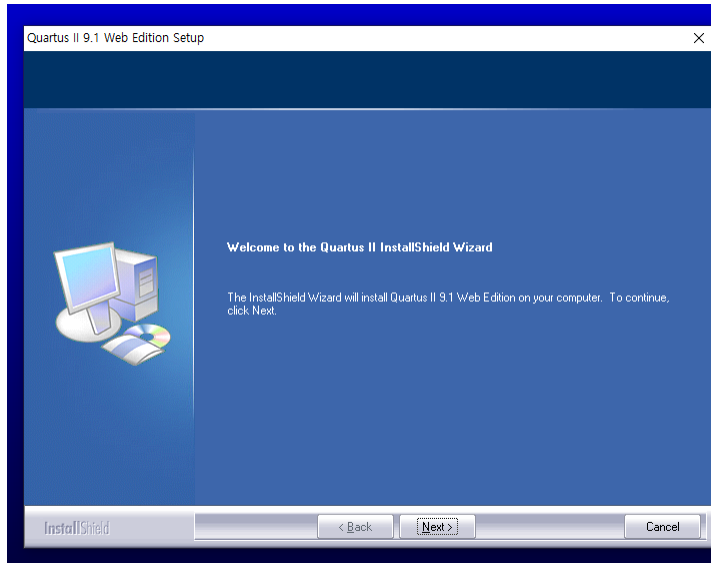
91\_quartus\_free.exe(1.42GB)를(를) 실행하거나 저장하시겠습니까?

실행(R)

저장(S)

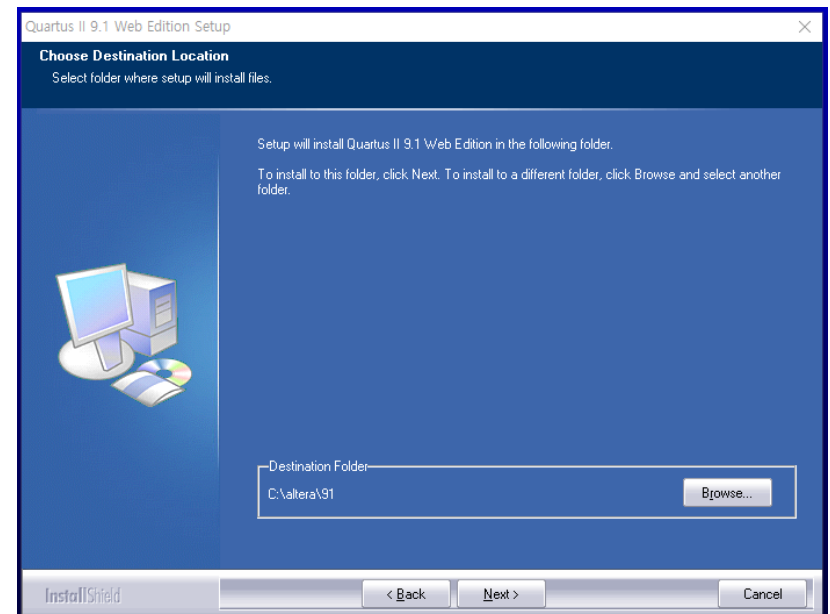
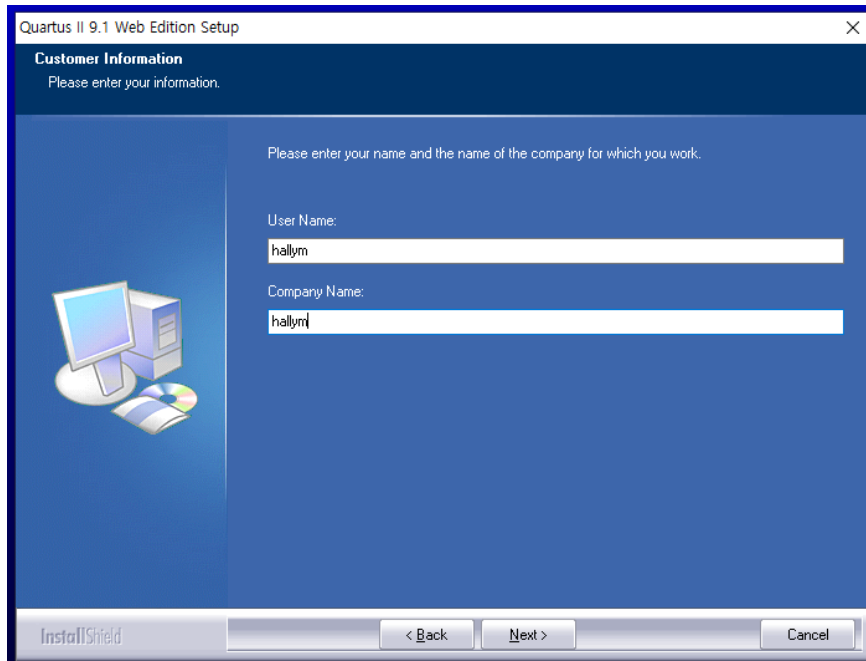
취소(C)

# [실습] Altera Quartus 설치

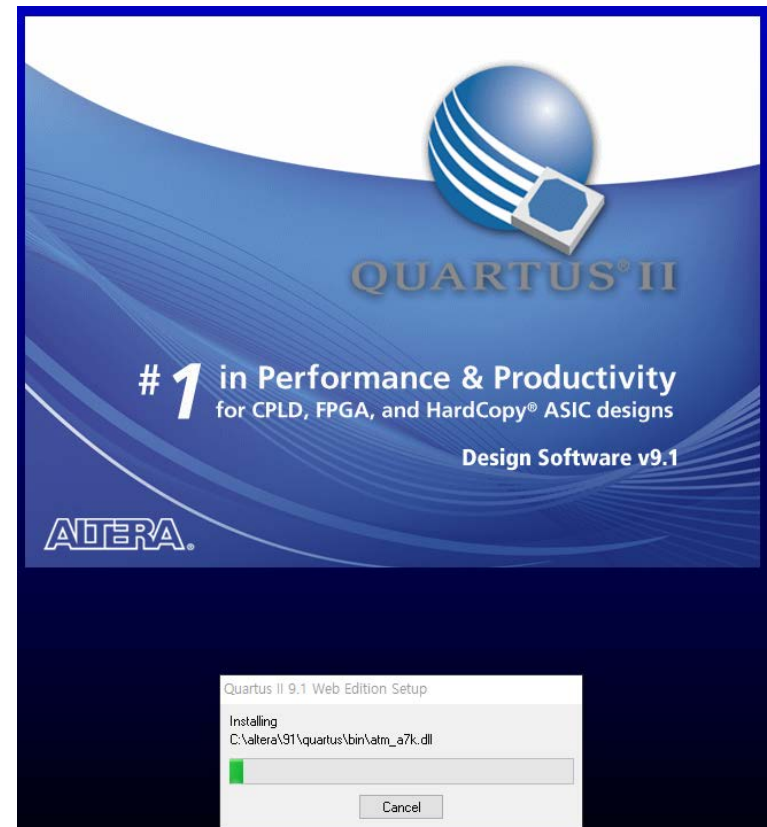
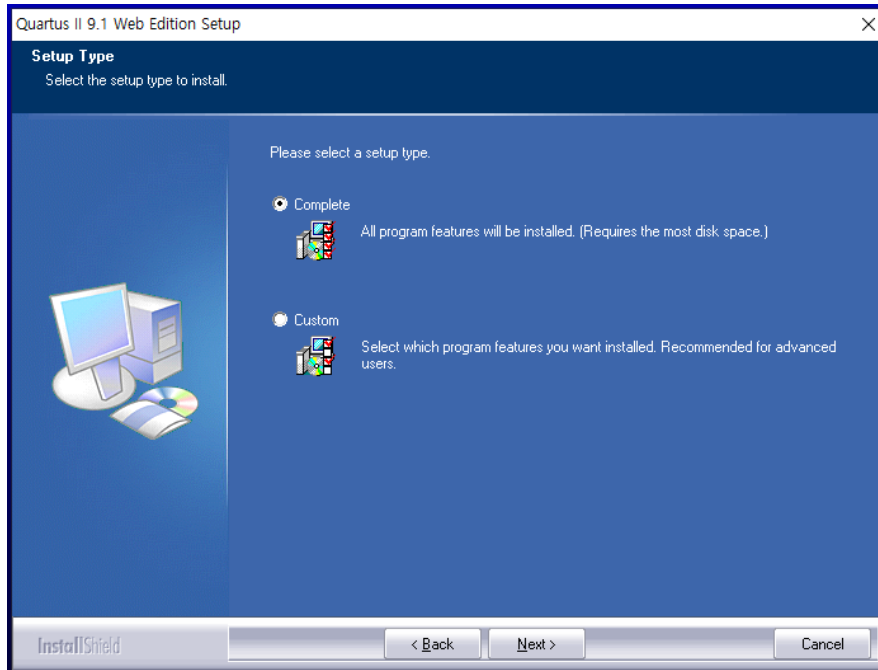




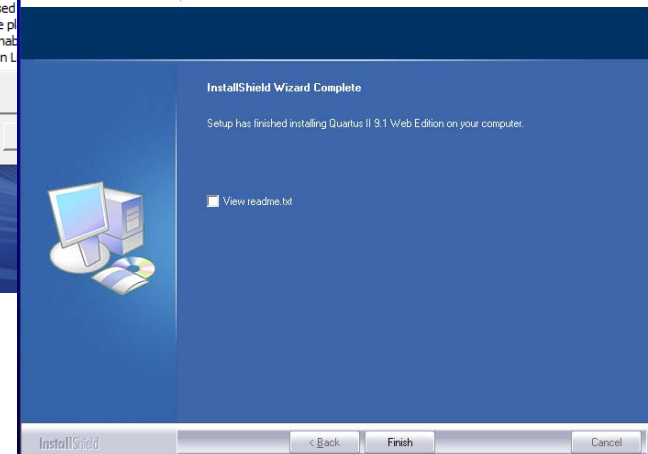
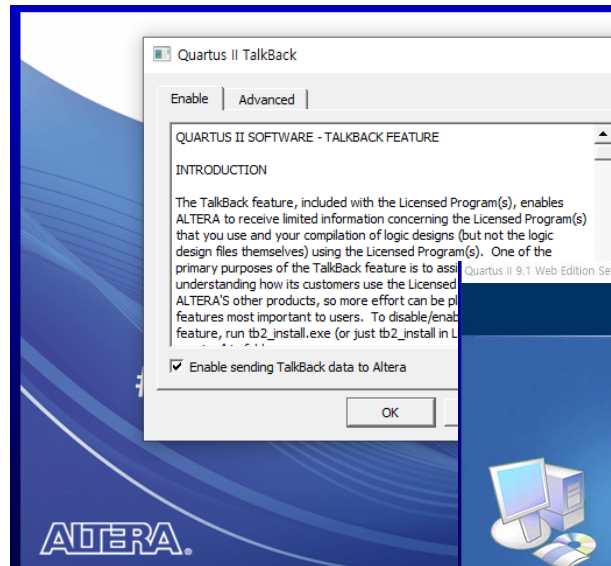
# [실습] Altera Quartus 설치



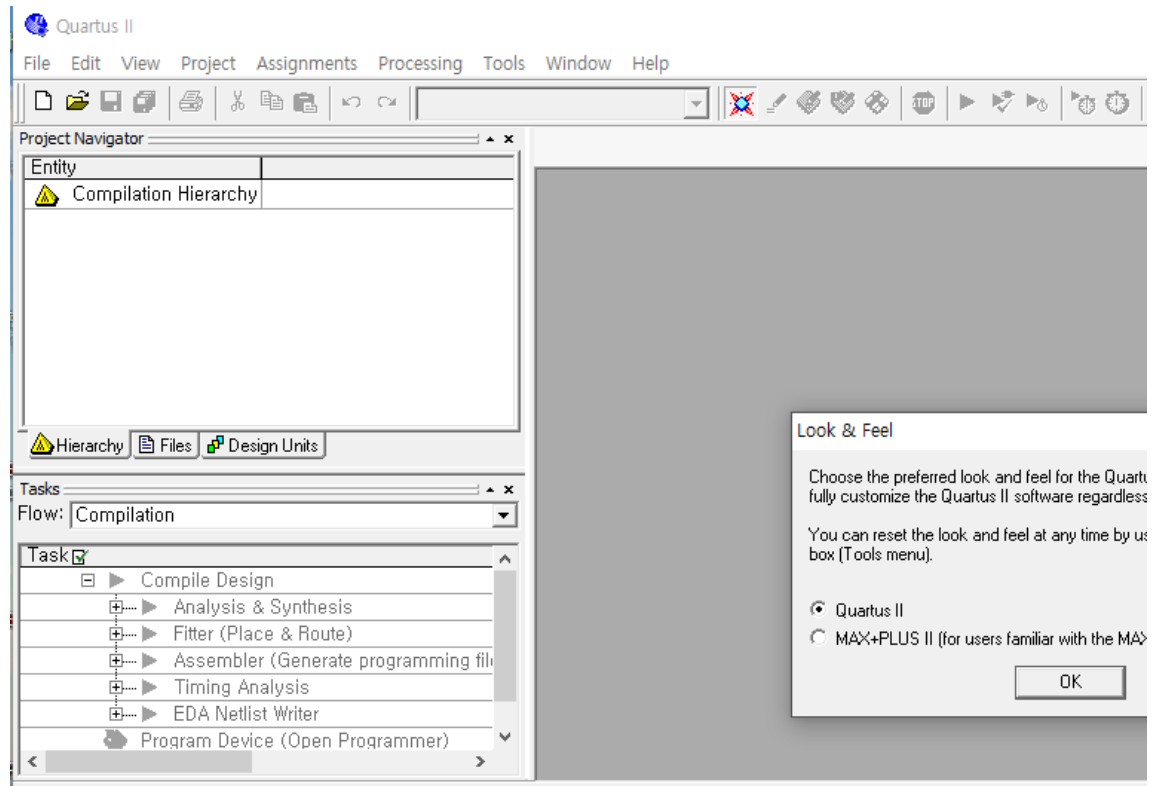
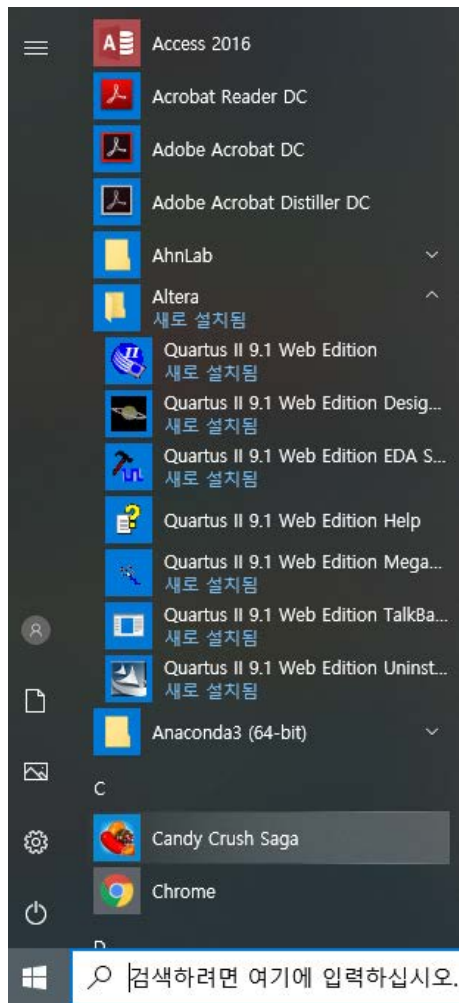
# [실습] Altera Quartus 설치



# [실습] Altera Quartus 설치



# [실습] Quartus 소프트웨어 실행



# [실습] New Project Wizard

## 1. Project 만들기

<주의사항> 프로젝트 이름에 한글이 들어가면 안됨.

- File -> New Project Wizard -> next -> 프로젝트 폴더이름
- 프로젝트 이름을 줄 때는 모듈 명과 같게 해야 한다.
- Family Device 선택 : Family를 사이클론 2 로 설정( 또는 Stratix II)
- available : ep2c35f672C8 -> next -> next -> finish

## 2. 블록 다이어그램 설계

- File 메뉴 -> new -> Block Diagram/Schematic File -> 설계에 들어간다

## 3. 컴파일

- Processing 메뉴 -> Start compilation

# [실습] Vector Waveform

## 4. Vector Waveform

- File 메뉴 -> new -> Vector Waveform
- vwf 파일이름을 프로젝트 이름과 동일하게 변경하여 저장
- > Name/Value 부분 더블클릭 -> Node Finder -> Filter(Pins all) -> List -> Input과 Output 핀 선택 -> OK
- > 컨트롤 하려는 핀을 선택 -> Overwrite Clock을 선택하고 input 값들의 Period를 조정

# [실습] Vector Waveform

## 5. simulation

- processing 메뉴 -> start simulation
- \* Simulation이 성공적으로 실행되면 Output핀의 Value가 기록된다.  
유의할 점은 Gate 마다 딜레이가 있기 때문에 결과값이 밀려 보이는 것이 이상한 것이 아니다.

## 6. Delay 조정

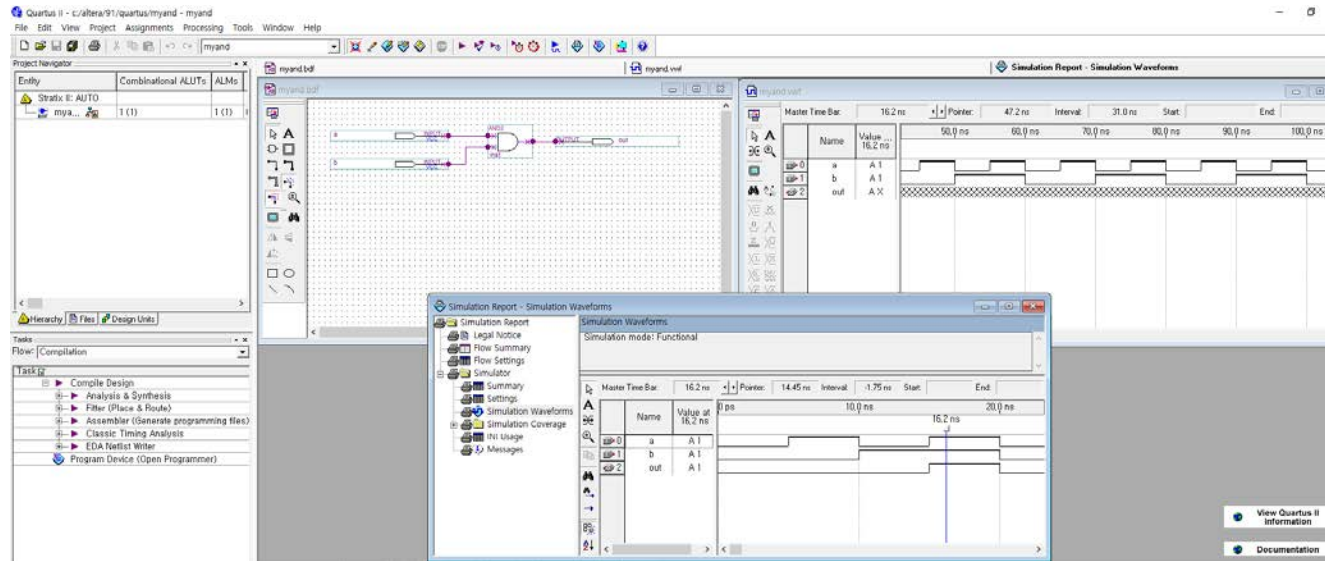
- delay를 없애기 위해서 Simulator tool에서 Simulation mode를 timing에서 functional로 바꾸어 delay를 처리한다.

## 7. 이후의 모든 Vector Waveform 컴파일은 Simulator tool 사용

- Simulator tool -> Simulation mode -> functional -> “Generate Functional Simulation Netlist” -> Start -> Report

# [과제] 04주차 실습과제

>> 저의 실행 예는 and 게이트를 테스트 한 것입니다. 여러분께서는 or 게이트를 테스트 해서 과제로 제출하시면 됩니다.



[과제] 지금까지의 모든 과정을 수행하여 위 예제의 그림처럼 결과 화면(1장)을 제출하세요.(제출파일명 : d\_03\_이름\_학번)

1. myor2 프로젝트를 생성 (입력은 a,b, 출력은 out\_자신의학번)
2. Block Diagram 설계
3. Vector Waveform 의 Report 결과