BAREFOOT ACADEMY

BA-Online

Course Prospectus

Barefoot Academy is proud to announce BA-Online – a collection of multiple one-day online course modules that cover a range of topics from introduction to basic concepts of data plane programmability all the way to advanced P4 programming techniques.

These hands-on courses allow you to receive world-class instructor-led training at your own pace and in the convenience of your own home or office. The course modules can be taken either individually or as conveniently organized bundles. The latter will help to ensure that you have taken the necessary pre-requisite course modules and pick up the right set of modules to achieve your own educational goals.

Course Goals

The overall goals for all the courses are to provide robust, hands-on introduction to the relevant subject that will allow the students to start or continue their development process. The courses are designed to complement, rather than replace the official documentation.

The relevant concepts are introduced and explained first and followed by carefully designed examples. The material is further reinforced through the specifically designed labs of various difficulty. To ensure the successful completion of labs, a dedicated online support channel is provided.

What is included?

Course tuition includes:

1. A ticket to the online, instructor-led lecture. Most lectures last for up to 3 hours with one or two short breaks
2. Lecture materials and lab guides in PDF format with lifetime updates
3. Two or five consecutive days of lab time on a preconfigured, cloud-based virtual machine (except for the preparatory-level modules)
4. Dedicated online support for the labs

Course Catalog

Course Nomenclature

All online courses use the 4-digit numbering (BA-**CLTM**) that is organized as follows:

C – The first digit of the course number indicates that this is an online course

- 1 – Online course module
- 3 – 3-Course Bundle
- 5 – 5-Course Bundle
- 9 – Complete course bundle

L – The second digit indicates course level:

- 0 – Preparatory
- 1 – Level 1
- 2 – Level 2

T – The third digit indicates a course module theme (subject)

- 0 – Subject introduction
- 1 – Mandatory pre-requisite course
- 2 – Data Plane Programming in P4
- 3 – P4 Studio SDE and Control Plane APIs
- 4 – ASIC Architecture

M – The fourth digit indicates a specific module within a given theme

For the bundles, the last two digits (**T** and **M**) are combined to form the bundle number

Examples:

BA-1121: "P4 programming: Multicast and L2 Switching"

1 – Online Course Module

1 – Level 1

2 – Data Plane Programming in P4

1 – Module number (Multicast and L2 Switching)

BA-3101: "Quick introduction to $P4_{16}$/TNA, P4 Studio SDE and Tofino ASIC"

3 – 3-Course Bundle

1 – Level 1

01 – Bundle number. The specific content of each bundle is described below.

Course Module List (subject to further revisions)

Please, see individual course module prospectuses for the detailed description of each of the module.

Preparatory-level Course Modules (planned)

- BA-1001: Introduction to Data Plane Programmability

Level 1 Course Modules

- BA-1111: Introduction to P4 and P4 Studio workflow. The very first program
- BA-1112: Advanced parsing and checksums in P4. L3 Switching and Access Control Lists
- BA-1113: Counters, meters and registers. Non-standard IPv4 processing
- BA-1121: Multicast, LAG and ECMP
- BA-1122: Mirroring, Resubmit and Recirculation
- BA-1123: Simple L2 Data Plane Project
- BA-1131: Introduction to P4 Studio SDE. Building and using P4 Studio SDE
- BA-1132: Barefoot Runtime APIs and Packet Test Framework
- BA-1141: Introduction to Tofino ASIC Architecture
- BA-1142: Optimizing for and Debugging P4 Programs on Tofino

Level 2 Course Modules (planned)

- BA-1211: Stateful Processing in Tofino
- BA-1212: Tofino Packet Generators
- BA-1241: Tofino-specific P4 optimizations and program fitting

Course Bundles

Course bundles are recommended groups of course modules that provide comprehensive training targeting the needs of different audiences.

- **BA-3101**: Quick Introduction to P4$_{16}$/TNA, P4 Studio SDE and Tofino™ ASIC
  This is an excellent, well-rounded course for engineers and architects, who want to sample everything without delving into too many details
    - BA-1111, BA-1131, BA-1141

- **BA-3102**: Comprehensive Introduction to P4$_{16}$/TNA
  This is a full set of pre-requisite modules that prepare a data plane designer to take more specialized P4 course modules.
    - BA-1111, BA-1112, BA-1113

- **BA-5101**: Comprehensive introduction to to P4$_{16}$/TNA, P4 Studio SDE and Tofino™ ASIC
  This is an excellent course that fully prepares a student for learning more advanced data plane programming concepts, while providing a broader view of the control plane interfaces and the ASIC architecture, It is a great choice for those who can't decide between BA-3101 and BA-3102, since it combines both in a convenient package
    - BA-1111, BA-1112, BA-1113, BA-1131, BA-1141

- **BA-5102:** Become a P4 master
  This course is intended for serious data and control plane designers who completed BA-5101, but would like to learn how to write more complex programs using such capabilities and multicast, traffic distribution over LAG or ECMP, mirroring, resubmit and more as well as start developing production-grade code using Barefoot Runtime Interface.
    - BA-1121, BA-1122, BA-1123, BA-1132, BA-1142

- **BA-5103**: Create your own P4 Course
  This course is intended for serious data plane designers, who want to learn more advanced concepts, and do have very specific needs as opposed to learning everything
    - BA-1111, BA-1112, BA-1113, plus a choice of any two of BA-112x or BA-122x modules

- **BA-9111**: Barefoot Academy Level 1 Diploma
  This course bundle covers everything an engineer needs to become a competent, well-rounded data and control plane developer and is roughly equivalent to our famous instructor-led on-site BA-102 course
    - All BA-11xx modules

Pre-requisites

- General understanding of network and telecommunications architecture and protocols. For non-engineers we highly recommend taking BA-1001 first
- Knowledge of C and C++ languages
- Knowledge of Python language
- Experience in data or control plane design is extremely helpful
- Good and reliable Internet access for both online lectures and VM access is a must

Sample Schedule

All individual course modules consist of a 3-hour online lecture with one or two short breaks. We recommend spending at least the next several hours doing the assigned labs. Class dates and times will be announced ahead of time and are subject to the specific demand.

Logistics

An event-specific link to ticket purchase site will be provided on both Barefoot Academy page as well as on Customer Portal and FASTER Forum. If you do not have an account on the Customer Portal or FASTER Forum, please contact Barefoot Sales representative first to get the password and establish an account.

To attend an online presentation, you will need to create a **free Zoom account, associated with your work email address**. Upon the registration, you will receive a link to the online event. You will also receive an invitation to establish a Slack account for lab support, also **associated with your work email address**.

A high-speed internet connection is required to attend the online presentation. Call-in numbers for higher voice quality might be provided, depending on the region. Please, connect to the online meeting 15 minutes before the start to work out all potential connection problems.

All necessary materials, including the presentation PDFs and lab exercises will be available through the Customer Portal or FASTER Forum a day before the start of the class. We highly recommend that you print the presentation PDFs and use them to take notes. Alternatively, these presentations can be loaded on a tablet, where the notes can be taken with an electronic pen.

The information about the lab Virtual Machines will be provided at the end of the lecture. VMs will be kept running for the next two or five days, depending on the ticket type. This time can be extended through a separate arrangement.

Important Notes

Barefoot P4 Studio™ SDE is a software product, developed independently from the software, available via p4.org. Some components of the SDE were contributed by Barefoot to p4.org, others rely on the code from p4.org, but the goals of the projects, the tools, and the workflows are different. P4.org software is a community-supported project with many resources freely available. This class covers Barefoot SDE and not p4.org software. Specifically, not covered are the Behavioral Model (BMv2), v1model and PSA $P4_{16}$ architectures and neither is P4Runtime.

$P4_{16}$ compiler for Tofino and BF-Runtime APIs are in active development as is the course module material. While Barefoot Academy Team strives to introduce Barefoot customers to the leading-edge software, bugs, errors and omissions may occur. The later versions of these course modules might significantly differ from the early ones.

The availability of each course module will be announced separately. Please, visit Barefoot Academy website at https://barefootnetworks.com/academy

The online presentations may be recorded and may be published, in whole or in part, in various media, including print, audio and video formats without further notice. If you do not want to participate, you may choose to either keep your audio and video connections muted or turned off or leave the call. By choosing to remain, you are consenting to the recording of the session.

Contact
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